ARCADIS
Infrastructure, environment, buildings

ARCADIS
30 West Monroe
Suite 1710
Chicago
Illinois 60603
Tel 312.332.4937
Fax 312.332.4434
www.arcadis-us.com

Mr. Michael Berkoff
Remediation Project Manager
USEPA Region 5 Superfund Division
Remedial Response Section #2
SR-6J
77 West Jackson Boulevard
Chicago, IL 606004

Subject:
Supplemental Groundwater Investigation
Allied Paper, Inc. Operable Unit, OU-1
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Date:
October 2, 2009

Contact:
Doug Cowin

Phone.
312.332.4937 x 11

Email:
doug.cowin@arcadis-us.c

Our ref:
B0064587.0001.00004

Dear Mr. Berkoff

Transmitted with this letter is the Draft *Supplemental Groundwater Investigation Report*, presenting the scope, methods, and findings of supplemental groundwater studies conducted on behalf of Millennium Holdings, LLC (MHLLC) for the Allied Paper, Inc. (Allied) Operable Unit (OU). These studies were conducted in response to City of Kalamazoo concerns related to whether or not groundwater from the Allied OU could potentially impact the City's Central Well Field.

During the time that the supplemental investigation was being developed and implemented, representatives of the City of Kalamazoo (City) participated in planning meetings and conference calls and provided a series of specific questions and comments. Many of these issues were discussed in detail during meetings on July 28 and September 10, 2009 between representatives of the Kalamazoo community, the United States Environmental Protection Agency (USEPA), the Michigan Department of Environmental Quality (MDEQ), and MHLLC. The City's comments were influential in shaping the *Groundwater Evaluation and Work Plan for Supplemental Investigation* (April 28, 2009). Although many of the City's comments are addressed in the draft report, we wanted to take the opportunity to provide additional explanation on several points, particularly those comments that address specific details or the overall scope of the investigation.

As a preliminary matter, the issues raised by the City and community deserve thoughtful and thorough consideration. All involved have invested a significant amount of time and energy addressing this issue, including a substantial effort by

MHLLC and ARCADIS on the supplemental groundwater investigation and follow-up on concerns raised by the City and community. The team of people who spent the last several months working through the questions and examining the data are experienced engineers, geologists, and scientists from the City, the Agencies (USEPA, U.S. Geological Survey [USGS], and MDEQ) as well as MHLLC and ARCADIS. Our view is that the Conceptual Site Model for groundwater flow at the Allied OU has been reinforced by these discussions and is supported by the new data and study.

There are four key elements of that model: (1) PCBs, where present, are essentially "bound" in the soils at the OU by virtue of the physicochemical properties of PCBs; (2) several naturally-occurring inorganic constituents move with groundwater in the surficial aquifer; (3) there is an upward hydraulic gradient from the deeper regional aquifer that tends to drive groundwater toward the surficial aquifer; and (4) groundwater in the surficial aquifer at the OU takes the path of least resistance and flows to Portage Creek.

The City has put forward that additional hydrogeologic data are necessary, primarily to: (1) confirm the upward gradient between the deep regional aquifer and the surficial aquifer; (2) establish that there exists a continuous confining layer between the surficial aquifer and the regional aquifer; and (3) determine if groundwater quality conditions have deteriorated. It is our belief that the fundamental elements of the conceptual model are adequately supported by the existing data, especially the existence of the upward gradient and the presence of a confining layer. The available data indicate that the upward gradient and confining layer are indeed present. Concerning the potential for groundwater quality degradation, no substantial changes have occurred at the site that would tend to degrade water quality. On the contrary, numerous site improvements and stabilization and control of waste materials have taken place. If anything, it is reasonable to expect some improvement in groundwater quality. We have heard both the MDEQ and USEPA express a view that existing data for the site are adequate for purposes of the Feasibility Study (FS), and the technical data available all mutually support the Conceptual Site Model. It is our view that additional investigation is unwarranted at this point. The USEPA has made clear however that monitoring will be a part of any remedy in which the paper residuals remain in place.

Other data support the Conceptual Site Model based on the hydrogeology. Over the long period of monitoring at the OU (including ongoing monitoring of groundwater, surface water, and leachate), no data have been observed to suggest movement of

PCBs or inorganics down to the deeper zone (see, for example, response to Comment #3, below). Further, as a result of the extensive work already completed at the Allied OU to contain and control sources of PCBs, conditions have stabilized and have been improving over time. The extensive network of monitoring wells across the OU – including those that are on adjacent properties – provide data that have confirmed our understanding of the situation, and will also alert us in the unlikely event that conditions change in the future.

Specific responses to key issues raised by the City and members of community are provided below.

1. **Groundwater Contour Map**

Prior to the July 28 meeting, a draft groundwater table contour map was presented to the City for data collected on June 25-26, 2009 as part of the Supplemental Groundwater Investigation. The City noted that water elevation data for monitoring wells MW-19BR, MW-204B, and MW-5R had not been considered in the preparation of the water table map (Figure 3-2).

The screens of these three wells are positioned below the water table, and therefore the associated water elevation data are not appropriate for use in preparation of the water table contour map. A water elevation data point for Monitoring Well MW-5R was inadvertently plotted on the map, but was not used in the preparation of the water table contour lines. This data point has been removed in the revised groundwater table contour map included in the draft *Supplemental Groundwater Investigation Report.*

2. **Potentiometric Surface Map for Deep Units of Surficial Aquifer**

The City expressed an interest in the development of potentiometric surface contour maps for groundwater flow in the deeper zones of the surficial aquifer at the Allied OU. The subsurface investigation activities completed, as described in the March 2008 *Remedial Investigation Report* (RI Report) finalized by MDEQ, documented the significant influence of vertical gradients on groundwater flow at the Allied OU. The RI Report presented flow nets constructed along several cross-sections that illustrate the vertical flow potentials between the various hydrostratigraphic zones within the surficial aquifer. The presence of strong vertical flow potentials, the discontinuous nature of several aquitard units within the surficial aquifer, and the focus of

monitoring locations on the shallow portion of the surficial aquifer make it difficult to construct a meaningful potentiometric surface map for these zones. However, ARCADIS believes that the important question of understanding the groundwater flow potential at depth in the surficial aquifer is better addressed with the use of hydrographs, which were prepared for three on-site monitoring well clusters and flow nets constructed along several key cross-sections (see Figures 3-5, 3-6, 3-8, 3-9, and 3-10). The evaluation of vertical flow at the three well cluster locations and the updated flow nets show clear evidence of an upward gradient from the deeper zones to the shallower zones of the surficial aquifer.

3. Reversal of Vertical Gradient in the MW-122A/AR/B Monitoring Well Cluster

City representatives communicated concerns that recent groundwater elevation measurements at shallow monitoring wells MW-122A and MW-122AR are conspicuously lower than measurements made historically (e.g., 2000). The City observed that the head difference between these shallow wells (MW-122A/MW-122AR) and monitoring well MW-122B – screened in the lower sand unit of the surficial aquifer – has been reduced from over three feet in 2000 to a fraction of a foot more recently. They also noted that water elevation measurements at this well cluster show an upward gradient between the upper and lower sand units of the surficial aquifer, where historically there was an apparent downward flow potential between the upper and lower sand units of the surficial aquifer at this location.

The differences in groundwater elevations and gradients between the present and 2000 are due to the installation of the impermeable cap over the Bryant Historical Residuals Dewatering Lagoon (HRDL) and Former Residuals Dewatering Lagoons (FRDLs) in 2004. Before construction of the cap, surface water in the lagoons freely drained into the adjacent sandy berm and the shallow groundwater system – this would have raised groundwater elevations in the immediate vicinity every time it rained. However, with construction of the cap, surface water now drains from the double-lined settling basin directly into Portage Creek, and not into the groundwater system. Consequently, as the groundwater system is no longer recharged (i.e., raised) by stormwater collected in the lagoon, groundwater elevations in the adjacent berm in which MW-122A and MW-122AR are located, have dropped.

As an additional note, current and historical water elevation data indicate that groundwater in both the shallow zone (MW-122A/AR) and the deep zone (MW-122B) of the surficial aquifer discharges to Portage Creek. As shown on Figure 3-8, the potentiometric surfaces of groundwater in the deep (MW-122B) and shallow (MW-122A/AR) zones of the surficial aquifer are consistently more than 8 ft higher than that of Portage Creek, providing definitive information that Portage Creek is the locus of groundwater discharge within the surficial aquifer.

4. Discussion of the Effects of On-Site Pumping, City Pumping, and Precipitation on Water Levels

The City requested additional discussion regarding the potential impacts that pumping associated with the groundwater extraction system at the OU, pumping at the Central Well Field, and/or precipitation might have had on the groundwater flow patterns observed at the Allied OU.

The effect of on-site pumping of groundwater is discussed both in the March 2008 RI Report and the Draft *Supplemental Groundwater Investigation Report*. On-site pumping of groundwater is conducted to mitigate the potential for groundwater mounding behind the sheet pile, which is located around the perimeter of the Bryant HRDL/FRDLs disposal area. The pumping rate is modest -- approximately 13 gallons per minute on average. Groundwater table contour maps are presented in the RI Report (Figures 23, 25 and 27) for periods prior to and during groundwater extraction. These figures all demonstrate that groundwater flows from the Allied OU to Portage Creek. This observation is consistent with our expectation that on-site pumping would not impact the over-riding regional flow patterns or groundwater flow at the OU, given that the 13 gallons per minute on-site pumping rate is insignificant compared to the estimated 2,000 to 5,000 gallons of groundwater per minute that discharges to Portage Creek between Cork and Alcott Streets.

There is no indication from the available data that pumping groundwater at the City's Central Well Field has any effect on groundwater conditions at the Allied OU. The deeper regional aquifer unit from which the Central Well Field draws water is "confined" at the Allied OU by an aquitard that tends to "seal" the top of the regional aquifer, preventing groundwater at the OU from flowing down to

the deeper aquifer. The confined condition of the regional aquifer hydraulically separates the regional aquifer from the surficial aquifer, and minimizes the potential influence of pumping at the Central Well Field on the surficial aquifer at the Allied OU. Note that pumping records for the Central Well Field were requested of the City on September 16, 2009 but have not been received to date.

An upward pressure gradient of 0.1 to 0.2 ft/ft exists between the deeper regional aquifer and the surficial aquifer in the area of the Allied OU. These gradients are based on measured potentiometric heads that are up to 15.9 ft higher in the regional aquifer than they are in the surficial aquifer, and which drive groundwater discharge to Portage Creek. For the City's well system to change/influence groundwater flow patterns or water levels in the surficial aquifer at the Allied OU, the upward gradient observed between the lower (deeper) regional aquifer and the shallow surficial aquifer would have to be reversed. Excessive pumping would be necessary to reverse an upward gradient of 0.1 to 0.2 ft/ft between the regional and surficial aquifers over the distance of more than 2000 feet between the City's Central Well Field and the Allied OU, and this situation is not probable.

With regard to the potential impacts of precipitation on groundwater flow patterns, the substantial body of groundwater elevation data collected at the OU over the past decade or more includes data for various seasons and from different precipitation events. Hydrographs were prepared using several years of water elevation for well clusters at the Allied OU, presented in the *Supplemental Groundwater Investigation Report* as Figures 3-7, 3-8, and 3-9. What minor evidence exists for seasonal variability due to precipitation is secondary to the overall trends of increasing groundwater levels over the last year, observed to be about 1 foot higher throughout the site. These data align well with USGS water elevation data from observation wells throughout this area of Kalamazoo County, which show regional water table elevations to be approximately 1 to 1½ feet higher than historical daily median levels.[1] Based on discussions with the County Health Department, this trend is likely due to increased precipitation over the last year. While there are water level changes

[1] http://groundwaterwatch.usgs.gov/WL.Sites.asp?S=421435085353701

in response to precipitation events at the Allied OU, there is no evidence of overall changes in the groundwater flow patterns.

5. Downward Hydraulic Gradient at Staff Gage #6

The City raised a question as to an apparent downward gradient at the location of Portage Creek Staff Gage #6 and monitoring well MW-14, located approximately 210 ft south of Staff Gage #6 (see Figure 3-1). In June 2009, the water head at Staff Gage #6 was observed to be 1.8 ft higher than the potentiometric head at MW-14. The surface water elevation measurement at Staff Gage #6 is anomalous compared to other surface water readings in that it is higher than groundwater elevations measured at all monitoring wells within a distance of 500 ft of the staff gage. This portion of Portage Creek appears to recharge the local groundwater system in this area. At this point in the watershed, Portage Creek has left the defined topographical valley present at the Allied OU and the landscape flattens out as the creek crosses the broader and relatively flatter portion of the greater Kalamazoo River valley. There may be localized changes in geology associated with this transition that cause groundwater at this location to behave differently than approximately 1,500 feet upstream at the Allied OU.

However, SG-6 and MW-14 are both located in the surficial aquifer (see Figure 2-3), and the localized downward gradient is from the shallow to deeper zone of the surficial aquifer and does not extend to the confined deep regional aquifer, where the Central Well Field draws water. In addition, Staff Gage #6 is located outside the boundary of the Allied OU – approximately 1,500 feet downstream of Alcott Street, the northern boundary of the OU – and is not near any deposits of paper-making residuals. Further, a substantial upward gradient (0.4 ft/ft) exists between the regional aquifer and the creek in this same area, as evidenced by the groundwater elevation measured at the closest deep well (MW-39), located 1,400 ft to the south. The water level in MW-39 was 26.2 ft higher than the water level measured at Staff Gage #6, indicating a significant upward gradient that more than offsets the downward gradient observed within the surficial aquifer at this location. As a result, there does not appear to be any potential for downward movement of groundwater to the regional aquifer in the area of Staff Gage #6.

6. Use of Pressure Transducers

During development of the scope of work for the Supplemental Groundwater Investigation, City representatives expressed an interest in employing pressure transducers to collect near-continuous water level readings for a period of several weeks at select locations. USEPA, MHLLC, and ARCADIS discussed the potential need for this type of data, and collectively agreed that given the availability of extensive existing water level data covering a period of several years and the consistency of post-cap groundwater elevation data at the Allied OU, additional long-duration water elevation data from pressure transducers would not be necessary to understand flow conditions at the OU. The pattern of groundwater flow has not been observed to vary significantly over the several years of available data, and the existing data do not suggest temporal shifts in groundwater flow that would impact groundwater migration from the OU.

7. Off-Site Well Information

The City requested that the date of installation for each off-site well be included in the well construction tables. Where available, these data have been included in Table 2-2 of the Supplemental Groundwater Investigation Report. This table was also revised to include information as to whether each off-site well is installed in the surficial or regional aquifer.

The City also requested clarification on the specific portion of the surficial aquifer screened (i.e., upper, intermediate, lower sand) for each well. While this information has been provided for wells located within the boundaries of the Allied OU, this level of detail is not available for off-site wells. Within the shallow aquifer there are discontinuous sand and silt layers that in some places off site make it difficult to assign a specific sub-zone of the surficial aquifer (see Figure 2-3).

8. Limitations on Data from Regional Aquifer

The City expressed concern that the number of monitoring wells screened in the regional aquifer was insufficient, and that the wells were spaced too closely to provide adequate characterization. While the three wells screened in the regional aquifer provide a limited data set, these wells are ideally located between the Allied OU and the City's Central Well Field. Further, the

groundwater elevation data from these wells, in combination with data for wells screened in the surficial aquifer at each location, consistently show a strong upward gradient between the two zones. These gradients are based on potentiometric head measurements that are up to 15.9 ft higher in the regional aquifer than they are in the surficial aquifer. The results from these wells are unambiguous, and provide consistent observation of considerable upward gradients from the deep regional aquifer to the surficial aquifer. The magnitude of the upward gradient suggests that these conditions are likely to be laterally extensive and representative of conditions over the long term. When combined with the known physical and chemical characteristics of PCBs that cause them to preferentially stay in one place adhered to solids and the presence of a confining layer between the surfical and deeper aquifers, we believe that there is no cause to conduct further investigation into conditions of the deep regional aquifer.

9. Collection of Additional Groundwater Analytical Data

The City suggested that the supplemental groundwater investigation include additional groundwater samples from monitoring wells at the Allied OU and off-site areas for a current and more comprehensive understanding of groundwater quality conditions onsite and in areas between the site and the City's Central Well Field.

Off-site groundwater sampling for chemical analysis was discussed at length in preparation of the work plan and it was decided to proceed with a hydrogeological investigation as the first step, to assess potential flow directions. Given that groundwater gradients and flow potential was found to be directed onto the site from upland areas to the east and west, and upward from the deeper regional aquifer, there does not appear to be a potential for the site to impact offsite groundwater to the west-northwest. Consequently, groundwater chemical analysis results from off-site locations would be indeterminate with respect to any influences of the Site. Furthermore, interpretation of groundwater analytical results would be confounded given the urban and industrialized area around the Portage Creek corridor and the numerous historical potential sources of groundwater contaminants. The lack of a flow pathway together with the complication of numerous potential sources makes the utility of off-site groundwater analytical results questionable.

As of the present time, the existing chemical analytical database consists of thousands of data points collected from over 100 monitoring wells and piezometers from several rounds of groundwater sampling conducted from 1993 to 2003, including Target Compound List compounds and Target Analyte List constituents, sampled in accordance with methods and procedures specified in a MDEQ-approved Quality Assurance Project Plan and consistent with USEPA CERCLA guidance. These data compose a groundwater database that is larger than those of the other Kalamazoo River Superfund Site OUs, and likely most comparable sites in the State.

The existing database is described in detail in the March 2008 RI Report, and that report includes the conclusion that "Although some earlier-collected data have been excluded, a considerable body of information is available that is sufficient to complete the FS; assess the present state of the OU; and inform decisions on future remedial actions." As discussed in the draft *Supplemental Groundwater Investigation Report*, all data reinforce the overall conceptual site model related to groundwater flow (upward flow potential from the deep regional aquifer to the surficial aquifer, and from there to Portage Creek), and there have been few detections of PCBs in groundwater over the entire time samples have been collected at the OU.

10. Characterization of Type III Landfill Disposal Area

The City indicated its belief that the contents of the former Type III Landfill had not been adequately characterized.

The former Type III Landfill disposal area was characterized by more than a dozen soil borings conducted during and prior to the RI, as presented in the March 2008 RI Report and the Description of Current Situation Report (Blasland & Bouck Engineers, PC 1992). In addition, 18 monitoring wells were installed within and downgradient of the former Type III Landfill during the RI, composing an extensive monitoring well network that we believe more than adequately characterizes groundwater conditions within and downstream of the disposal area. Samples of groundwater, soil, and residuals in this area were analyzed for Target Compound List volatile organic compounds, semi-volatile compounds, pesticides, PCBs, and Target Analyte List inorganic constituents. The data associated with the borings and the samples collected from the monitoring wells have not revealed any unknown or unexpected conditions in the landfill. As part of the final remedy for the OU, additional

characterization samples may be collected, if necessary to design and implement the cleanup action in this area.

11. Drinking Water Well Survey

In an effort to identify potential groundwater receptors in the vicinity of the Allied OU, the City recommended that MHLLC evaluate records for properties near the OU for which City water service is not provided. The ensuing study indicated that there are no wells used for potable purposes within 0.25 miles of any boundary of the Allied OU.

For the water well survey, ARCADIS obtained addresses of properties within 0.25 miles of the Allied OU using the City of Kalamazoo Online Geographic Information System. The City of Kalamazoo Public Services Environmental Services Division then identified those properties that do not receive a water bill. ARCADIS further narrowed the list of properties to exclude those that are vacant and have no building or housing structure onsite. The remaining list of properties, which are located within 0.25 miles of the Allied OU, do not receive a water bill, and are not vacant, is summarized in attached Table 1. This list was forwarded to the Kalamazoo County Health & Community Services Department (County Health Department) on September 17, 2009 to identify any properties for which it has records of well installation. The County Health Department indicated that it does not have any records of wells on these properties.

12. Groundwater Constituents of Concern

The City suggested that inorganic constituents in shallow groundwater at the Allied OU should be given more consideration since certain of these constituents are observed in the March 2008 RI Report as exceeding MDEQ groundwater criteria.

The RI Report highlighted iron, manganese, and arsenic as exceeding MDEQ groundwater criteria. For iron and manganese, a Primary Maximum Contaminant Level (MCL) – established to protect human health – has not been set and the Secondary MCLGs for these constituents are based on

aesthetic considerations like taste and not health effects.[2] As a result, there is no reason to expect that the presence of these constituents poses a potential for adverse health effects from a drinking water exposure pathway associated with the Allied OU.

As for arsenic, the elevated concentrations in groundwater at the OU are consistent with elevated concentrations found throughout Kalamazoo County. A representative from the County Health Department stated that arsenic is present all across the region at naturally high levels well above the MCL.[3] Further, analytical results for subsurface soils and residuals presented in the March 2008 RI Report [Table 4-2H (CD)] indicate that average arsenic concentrations in native soils are approximately three times greater than those of paper residuals, indicating that the residuals are not a likely source of arsenic in groundwater at the Allied OU.

Other factors considered in identifying a limited list of constituents of concern for groundwater at the Allied OU are:

- There are no known wells used for drinking water onsite or within 0.25 miles of the OU. Based on the available data, any private wells in the vicinity are likely to be upgradient of the Allied OU.

- Given City, County, and State regulations and ordinances regarding the installation of wells for potable use, no drinking water wells are expected to be constructed under reasonably foreseeable future uses of the OU.

- There is no conclusive evidence of a complete drinking water pathway to offsite areas (CH2M Hill 2009).

---

[2] Secondary MCLGs are not considered enforceable. http://www.epa.gov/safewater/contaminants/index.html#sec.

[3] Cowin, Douglas, ARCADIS, personal communication with Kim Finkbeiner of the Kalamazoo County Health & Community Services Department, September 10, 2009.

- Any final remedy to address the presence of PCBs is expected to address co-located constituents.

The Supplemental Groundwater Investigation focused on groundwater flow pathways, and provides information that is applicable to the potential movement of groundwater and any associated constituents, including inorganics. In summary, if groundwater from the Allied OU is not reaching the Central Well Field, there is no reason to expect any contaminants that might be contained in the groundwater at the Allied OU would reach the Well Field.

The results of the Supplemental Groundwater Investigation were conclusive and reinforce the established Conceptual Site Model for the Allied OU that on-site groundwater flows to Portage Creek, and upward hydraulic gradients from the regional aquifer drive groundwater toward the surficial aquifer. These new data support findings developed over the past decade, and therefore we do not believe additional investigation activities are warranted. As a result, we do not propose conducting any additional investigations at this time, and instead believe it is appropriate to shift our full focus to the FS phase of the process and the development of a range of remedial alternatives for the Allied OU. We understand that the issues discussed above are of importance to the City and community of Kalamazoo, and MHLLC and ARCADIS are open to participating in further discussions with stakeholders to discuss these matters.

Sincerely,

ARCADIS

Douglas K Cowin, P.G.
Associate Vice President
Principal Hydrogeologist

Copies:
James Saric, USEPA
Paul Bucholtz, MDEQ
Bob Kay, USGS
Jeff Keiser, CH2MHill
Stephen Weishar, MHLLC
Michael J. Erickson, ARCADIS
Lisa Coffey, ARCADIS

Allied Paper, Inc./Portage Creek/Kalamazoo River/Superfund Site
Groundwater Evaluation and Supplemental Investigation

Table 1 -- City of Kalamazoo Water Bill Verification Summary

Address	Receives Water Bill from the City of Kalamazoo Water Department		Comments
	Yes	No	
400 Bryant St.		X	Commercial building located on property
314 E. Alcott St.		X	Warehouse located on property
320 E. Alcott St.		X	Warehouse located on property
405 E. Alcott St.		X	Industrial building located on property
524 E. Alcott St.		X	Residential building located on property
130 E. Cork St.		X	Retail store and residential building on property
440 E. Cork St.		X	Warehouse located on property
805 E. Cork St.		X	Warehouse located on property
818 Foley St.		X	Residential building located on property
424 Homecrest Ave.		X	Residential building located on property
3010 Lovers Lane		X	Medical Building located on property
3026 Lovers lane		X	Commercial Building located on property
600 Phillips St.		X	Senior citizen housing on property
600 Plastics Ave.		X	Office building located on property
2836 Portage St.		X	Shed located on property
2924 Portage St.		X	Retail store and residential building on property
3103 Portage St.		X	Residential building located on property
2713 S. Burdick St.		X	Residential building located on property
3210 S. Burdick St.		X	Residential building located on property
3316 S. Burdick St.		X	Warehouse located on property
15 W. Cork St.		X	Warehouse located on property
135 Whitcomb St.		X	Residential building located on property
520 Witwer Ct.		X	Residential building located on property

Notes:

1. Addresses obtained from the City of Kalamazoo Online Geographic Information System provided by the Information Technology Department.
2. Water Billing Information provided by the City of Kalamazoo Water Department.

ARCADIS

infrastructure, environment, buildings

Allied Paper, Inc./Portage Creek/
Kalamazoo River Superfund Site

Supplemental Groundwater Investigation Report

Allied Operable Unit, Kalamazoo, Michigan

October 2009

ARCADIS

DRAFT FOR FEDERAL AND STATE REVIEW

Lisa Coffey, P.G. (PA PG003176G)
Principal Geologist

Douglas K. Cowin, P.G.
Associate Vice President/Principal Hydrogeologist

Michael J. Erickson, P.E.
Associate Vice President/Principal Engineer

Supplemental Groundwater Investigation Report

Allied Operable Unit, Kalamazoo, Michigan

Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site

Prepared for:
Millennium Holdings, LLC

Prepared by:
ARCADIS
6723 Towpath Road, P.O. Box 66
Syracuse, N.Y. 13214-0066
Tel 315.671.9164
Fax 315.446.8053

Our Ref.:
B0064587.0001.00003

Date:
October 2009

Tables

Figures

1. Introduction

On behalf of Millennium Holdings, LLC (MHLLC[1]), ARCADIS has completed Supplemental Groundwater Investigation activities at the Allied Operable Unit (Allied OU) of the Kalamazoo River Superfund Site to obtain additional information regarding the potential flow paths of groundwater from the Allied OU. These activities were completed at the request of and with the approval of the United States Environmental Protection Agency (USEPA). The primary goal of the supplemental work was to address concerns expressed by the City of Kalamazoo (the City) in their September 17, 2008 correspondence, titled *Interim Technical Responses to the Allied Paper Operable Unit, Kalamazoo, Michigan, Remedial Investigation Report* (City of Kalamazoo 2008a), particularly with regard to the potential for polychlorinated biphenyls (PCBs) present at the Allied OU to migrate to the City's drinking water wells. In its document, among other things, the City expressed the concern that this issue was not adequately addressed in the Remedial Investigation (RI) Report for the Allied OU, which was issued by the Michigan Department of Environmental Quality (MDEQ) in March 2008 (MDEQ 2008a). In subsequent discussions, the City also expressed concern that should there be a direct flow path for groundwater from the Allied OU to the City's Central Well Field, the public water supply might be affected by inorganic constituents that have been detected in samples of groundwater collected from certain shallow monitoring wells at the Allied OU.

To better understand the concerns of City representatives, ARCADIS and MHLLC convened a series of teleconferences and meetings, concluding with a meeting on April 14, 2009, attended by the USEPA, MDEQ, and City and community representatives. These discussions resulted in the development of the proposed scope of work, presented in the *Groundwater Evaluation and Work Plan for Supplemental Investigation* (Work Plan), dated April 28, 2009 (ARCADIS 2009). Drafts of the Work Plan were shared and discussed among key stakeholders, including the City. The Work Plan was approved by the USEPA on May 26, 2009, and field activities were subsequently implemented in late June and early July 2009. The preliminary indications of the investigation were presented to the USEPA, MDEQ, the City, and the public on July 28, 2009. This report presents the data and findings of the Supplemental Groundwater Investigation.

1.1 Purpose

The overall purpose of the Supplemental Groundwater Investigation activities described in this report was to address the City's concern that constituents present in the shallow

[1] LeMean Property Holdings Corporation (LeMean) owns the Kalamazoo River Allied site. LeMean is a wholly owned subsidiary of Millennium Holdings, LLC (MHLLC). MHLLC is directing the work at the site on behalf of LeMean.

groundwater at the Allied OU could impact the City's Central Well Field via groundwater migration.

The City's concern stems from a regional groundwater flow model prepared by the City that indicates that the limits of the 5-year time of travel zone of the Central Well Field potentially extends at depth beneath the Allied OU. The USEPA-approved RI Report (MDEQ 2008a) shows the capture of shallow groundwater by Portage Creek.

1.2 Site History

The Allied OU is one of four land-based OUs associated with the Kalamazoo River Superfund Site, and encompasses 89 acres along Portage Creek within the City of Kalamazoo, Michigan. The limits of the Allied OU are shown on Figure 1-1.

The Allied OU includes areas that were associated with operation of the former Bryant and Monarch Paper Mills. These mills were initially operated using virgin paper pulp to create paper products; however, starting in approximately the 1950s, the mills in the Kalamazoo area began to recycle waste paper. Carbonless copy paper produced between approximately 1957 and 1971 was included in the recycled waste paper, and was later found to contain PCBs. As a result, a portion of the paper-making residuals (residuals) associated with the Allied OU contain PCBs.

A series of remedial measures have been implemented at the Allied OU, the most significant of which was the excavation of approximately 146,000 cubic yards of PCB-containing residuals and soil from the Former Bryant Mill Pond area of Portage Creek. This work was completed as a time-critical removal action by the USEPA, and the excavated materials were placed within existing waste management areas of the property, west of Portage Creek. These disposal areas were subsequently capped. Additional interim response actions included:

- Installation of approximately 2,600 linear feet of sheet piling along the west bank of Portage Creek in 2001;
- Construction of a landfill cap, consistent with Michigan Act 451, Part 115 solid waste regulations;
- Installation of a groundwater recovery system to mitigate mounding of groundwater behind the sheet pile wall; and

- Excavation and onsite consolidation, within existing waste management areas that were subsequently capped, of additional residuals from the east side of Portage Creek and from the west side of the creek between the sheet pile wall and the creek.

A Feasibility Study (FS) is underway for the Allied OU that will evaluate various alternative remedies to address remaining concerns. The FS, which is scheduled to be submitted to the USEPA in October 2009, will incorporate data from the RI and the Supplemental Groundwater Investigation.

1.3 Existing Information

Over the past 16 years, an extensive series of investigations has been completed at the Allied OU and a large database has been developed. Tables of historical groundwater elevation data for the Allied OU and neighboring properties are included in Attachment A. An overview of information from the RI, and additional data collected following submittal of the document that can be drawn on to understand the hydrogeologic environment and the potential for transport of PCBs or inorganics in groundwater are presented below.

1.3.1 Hydrogeologic Setting

The unconsolidated materials and groundwater investigated at the Allied OU are within the surficial aquifer unit (MDEQ 2008a), which is subdivided into several transmissive zones that are separated locally by discontinuous confining layers. The lowermost of the transmissive zones of the surficial aquifer unit is identified in the RI Report as the "Lower Sand" (MDEQ 2008a). The groundwater and surface water elevation data collected prior to completion of the Supplemental Groundwater Investigation, as described in the RI Report, show that shallow groundwater discharges to Portage Creek. A series of groundwater flow maps prepared for the Allied OU consistently show groundwater contours that parallel the creek, indicating that groundwater flow is to the creek, with a northerly component of flow at the north end of the site in the vicinity of the dam. Monitoring well clusters, consisting of well groups with screens placed at different depths, have shown upward vertical gradients from the lower sand to the shallower geologic units and Portage Creek.

Two groundwater flow models completed for the Kalamazoo area (City of Kalamazoo 1999; U.S. Geological Survey [USGS] 2004) include horizontal "confining" units that extend beneath the Allied OU. A confining unit, or aquitard, is a geologic layer that limits or constrains the vertical movement of groundwater, and where laterally extensive, can hydraulically separate more transmissive strata. Cross-section B" to B"' (Figure 1-3), constructed from the Central Well Field through the Allied OU to the Millwood Well Field, at

the location shown on Figure 1-2 shows the upper confining unit as a clayey silt, shown in green on the figure. This aquitard was not encountered during site investigations at the Allied OU because monitoring wells were not installed to the depth of the aquitard. As shown on Figure 1-3, in the area of the Central Well Field and further north toward the Kalamazoo River, one continuous unconfined sand unit is present, and the confining unit is absent. However, proceeding south, two monitoring wells south of the Central Well Field (81-10 and 81-11) indicate the presence of a thin clay unit that appears to be the northernmost extent of the confining unit (Figure 1-3). Three boring logs for wells located near the northern end of the Allied OU that were completed for environmental investigation of the neighboring Strebor property, clearly show the presence of a substantial clay unit aquitard, and the unit thickens toward the south as evidenced by the Millwood Well Field well logs. Based on the available data from supplemental information sources (MDEQ 2008b; Bay West 1991; City of Kalamazoo 1999), the continuous presence of the aquitard below the entire Allied OU can be inferred.

The presence of a continuous confining unit would limit the physical and chemical interface between the surficial aquifer and the regional aquifer in which the Central Well Field wells are installed. Further evidence indicating that groundwater from the Allied OU is not traveling toward the Central Well Field is provided by groundwater gradients. As discussed further in Section 3.3, regional data, including historical data from Strebor wells (Bay West 1991), indicate that there is an upward gradient from the regional aquifer unit to the surficial aquifer unit. The data available prior to collection of Supplemental Groundwater Investigation data suggested the presence of an aquitard between the surficial aquifer and the regional aquifer, and demonstrated the presence of upward vertical gradients. The presence of these conditions suggests that a complete migration pathway from the Allied OU to the City Central Well Field does not exist.

1.3.2 PCB Fate and Transport

Available information suggests that PCBs are not likely to impact the City's Central Well Field for the following reasons:

- PCBs are hydrophobic and do not readily dissolve in water, preferring to adhere to soil or other solids (USEPA 1979; MDEQ 2008a, 2008b). To the limited extent that PCBs do enter groundwater, travel pathways would be dictated by groundwater gradients.

- Groundwater samples from the Allied OU generally do not contain PCB concentrations above MDEQ criteria or the USEPA's Preliminary Remediation Goals (CH2M Hill 2009). Exceptions are a few instances where a well was screened in close proximity to a layer

of PCB-containing residuals. Figure 1-4 illustrates the results of PCB analysis of groundwater samples collected in 2002 and 2003, following implementation of the remedial measures completed to date. As shown, out of a total of 53 locations sampled, MDEQ's Groundwater/Surface Water Interface (GSI) criterion for PCBs of 0.2 micrograms per liter (ug/L) was exceeded at three shallow monitoring points screened in direct contact with residuals. The Residential Drinking Water (RDW) criterion of 0.5 ug/L was exceeded in one split sample collected by the MDEQ (MDEQ 2004, 2008a). PCBs were detected at a concentration of 0.549 ug/L at MW-8A on October 29, 2002. The primary and duplicate samples collected by MHLLC on the same date contained PCBs at concentrations of 0.33 and 0.28 ug/L, respectively; below the RDW criterion (MDEQ 2008a).

- Prior work at the Allied OU (MDEQ 2008a) suggested that shallow groundwater discharges to Portage Creek.

- Water samples collected between October 2005 and the present from the influent of the Allied OU leachate collection system contained a detectable concentration of PCBs below both the GSI and RDW criteria on one date. A total of 38 samples were collected between October 2005 and the present, consisting of monthly samples from March 2006 through December 2008, and biannual samples from December 2008 to the present. Of these, all but one sample (97 percent) were non-detect for PCBs. The single detection was reported at the detection limit (0.1 ug/L), which is below the MDEQ's GSI criterion for PCBs. All of these samples are from water in direct contact with PCB-containing residuals, again confirming the hydrophobic nature of PCBs.

1.3.3 Inorganic Constituents in Groundwater

The RI Report indicates that certain naturally-occurring inorganic constituents (most notably iron, manganese, and arsenic) have been detected in certain shallow groundwater samples at the Allied OU at concentrations that slightly exceed (i.e., are within the same order of magnitude of) MDEQ groundwater criteria. The City of Kalamazoo has expressed concern that should there be a direct flow path for groundwater from the Allied OU to the City's Central Well Field, the public water supply might be affected by these inorganic constituents. As discussed in the following sections, the additional studies conducted for the Supplemental Groundwater Investigation were also useful in consideration of inorganic constituents in groundwater.

2. Scope of Investigation

ARCADIS evaluated various approaches and data needs required to assess the potential for a complete groundwater pathway from the Allied OU to the City's Central Well Field. Establishing an expanded hydrogeologic conceptual model, by providing additional measurement of hydraulic gradients in the vertical and horizontal directions, was selected as a direct method to assess whether the potential exists for PCBs present at the Allied OU to impact the City's Central Well Field. The primary hypotheses, which the investigation was designed to verify or disprove, are that shallow groundwater at the Allied OU discharges to Portage Creek, and that a hydraulic head differential across the low-permeability zone that underlies the Allied OU creates an upward vertical gradient, precluding potential flow to the City's Central Well Field. Synoptic measurement of water levels at available locations within and beyond the Allied OU in the direction of the City's Central Well Field was selected as the most direct and efficient way to test this hypothesis. The use of pressure transducers to collect near-continuous measurements at selected monitoring locations was considered to obtain information regarding temporal changes in groundwater flow conditions; however, due to the large amount of historical groundwater elevation data available (see Attachment A) and with the concurrence of USEPA, this method was determined to be unnecessary. Pressure transducers would have been considered in follow-up activity if the initial work suggested the need.

2.1 Identification of Potential Groundwater and Surface Water Elevation Monitoring Points

During the development of the scope of investigation for this work effort, nearby properties that have been the subject of environmental investigation were identified. The purpose of this activity was to identify existing monitoring wells near the Allied OU that could potentially provide an expanded array of groundwater monitoring points and allow for better characterization of groundwater flow patterns north and west of the Allied OU, toward the City's Central Well Field. Three properties were identified: Panelyte, Strebor, and Performance Paper. Figure 2-1 shows the locations of these neighboring properties relative to the Allied OU. Monitoring wells on each of these properties were used to obtain groundwater elevation data to provide a distribution of data points extending beyond the limits of the Allied OU.

The Strebor property is located west of the northern part of the Allied OU, and monitoring wells are present at and surrounding that property due to past environmental investigations. An active groundwater pump and treat system is also present at the Strebor property. The Panelyte property is located north of the Western Disposal Area at the Allied OU, and west of Portage Creek. Performance Paper is located north of Alcott Street, on both sides of Portage

Creek, and contains a well network previously installed during environmental investigations. Tables 2-1 and 2-2 identify the monitoring points identified for field measurement.

Of the wells identified for inclusion, three deep monitoring wells installed by Strebor that extend into the deep regional aquifer unit are of particular interest. These wells, MW-37, MW-39, and MW-40, are ideally located north and west of the Allied OU (see Figure 2-2) and each well is paired with a second well screened in the shallower, surficial aquifer unit. By comparing the relative hydraulic heads at these well cluster locations, the vertical gradient between the surficial aquifer unit that is proximal to the Allied OU residuals and the deep regional aquifer unit that is used as a drinking water source for the City, can be obtained. The remaining wells (Figure 2-2) monitored at the Allied OU, Panelyte, and Performance Paper properties are screened at various depths within the surficial aquifer unit. Additional well installations were considered but were not deemed necessary after locating appropriately positioned offsite wells. Figure 2-3 illustrates the relationship of the various monitoring well depths relative to each other and to the surficial and regional aquifer units. These units were described by the MDEQ (MDEQ 2008b) based on a review of the Groundwater Flow Model and Capture Zone Delineations prepared by the City of Kalamazoo (City of Kalamazoo 1999).

2.2 Survey Activities

To ensure that the water levels collected are referenced to a common survey datum, all of the offsite wells were surveyed between June 25 and 29, 2009 by licensed surveyors, Prein Newhof of Kalamazoo, Michigan. The top of inner casing elevations were recorded to the nearest 0.01 foot, and the ground surface elevations were established to the nearest 0.1 foot. Additional surface water level measurement locations were established at the locations shown on Figure 2-2 to provide further control on the relationship between surface water and groundwater elevations. The survey elevations are included in Tables 2-3 and 2-4.

2.3 Water Level Measurements

On June 25 and 26, 2009, water level measurements were collected at 123 monitoring wells, six staff gauge locations along Portage Creek, and one staff gauge in an area of standing water located in the southwestern part of the Allied OU. During the June 25 and 26 event, a groundwater extraction system was actively pumping at the Strebor property. A second round of measurements for a subset of 23 wells located in the vicinity of the Strebor property was conducted on July 2, 2009 during a period of shut down of the Strebor groundwater recovery system. All measurements were made using a weighted electronic water level probe per standard practices commonly accepted by USEPA and MDEQ. The collected data are summarized in Tables 2-3 and 2-4.

2.3.1 Groundwater Elevation Measurement Locations

The locations of the water level measurements are shown on Figure 2-2. All measurements were made by ARCADIS personnel, with the exception of measurements made at the Strebor wells, where as a condition of property access, Strebor's consultants collected the water level measurements under the observation of ARCADIS personnel.

2.3.2 Surface Water Elevation Measurement Locations

Due to the key role of Portage Creek in the behavior of groundwater in the study area, surface water elevation measurements were collected at the existing staff gauges and additional measurement points on existing bridge and dam abutments. In total, six points along the creek were measured. In addition, a temporary measurement point was established in a small area of standing water in the southwestern part of the Allied OU.

2.4 City of Kalamazoo Production Well Data

As part of the Supplemental Groundwater Investigation, ARCADIS also reviewed sample analytical data provided by the City for its water supply system monitoring program. The City's monitoring program has not identified PCBs in samples of groundwater collected from the Central Well Field. In 2008, samples were analyzed with analytical equipment capable of achieving detection levels well below the threshold achievable by USEPA standard methodology (USEPA 8082). Samples collected from 11 City wells in Well Fields #1 and #3 were reported to have no detections of PCBs at a detection level of 50 parts per trillion (Table 2-5), as reported in tables provided by the City of Kalamazoo via electronic mail (City of Kalamazoo 2008b). This provides direct evidence that a complete pathway does not exist for PCBs to migrate from the Allied OU to the City Central Well Field.

ARCADIS also reviewed the City's groundwater modeling results, which indicate that the Allied OU lies within a 5-year time of travel to the City's Central Well Field. PCB-containing residuals lay in an uncontrolled state for approximately 50 years subject to precipitation and natural processes, prior to the implementation of remedial actions. Given this 50-year time period, the absence of PCBs at the Central Well Field strongly suggests that a migration pathway does not exist from the Allied OU to the City's wells. Any further controls and remedial measures completed at the Allied OU following completion of the FS will further reduce any potential for migration offsite.

3. Investigation Results

Field data collection resulted in a substantial set of groundwater and surface water elevation data extending northward and westward from the Allied OU, in the direction of the City's Central Well Field. A total of 123 groundwater elevation measurements were collected; 75 from Allied OU monitoring wells and 48 from offsite locations. Surface water elevation measurements were collected at six locations along Portage Creek, and the elevation of standing water in the southwestern part of the Allied OU was also measured. The majority of the data allow for detailed characterization of the shallow surficial aquifer unit, and three monitoring well clusters provide data regarding the potential for vertical interaction between the surficial and regional aquifers in the vicinity of the Allied OU. The evaluation of the collected data is discussed in the following sections.

3.1 Groundwater Flow in the Surficial Aquifer Unit

A water table groundwater contour map, developed using the data collected on June 25 and 26, 2009, is shown on Figure 3-1. Portage Creek appears to be the primary influence on the configuration of the water table surface within the OU. In the main disposal area of the Allied OU, shallow groundwater discharges radially to Portage Creek. North of Alcott Street, the influence of Portage Creek as a location of groundwater discharge appears to be mitigated to some degree by the presence of a concrete liner, which extends from Alcott Street northward to south of Reed Avenue. In this area, shallow groundwater is influenced, although not completely captured, by the creek. There is a northerly (i.e., downstream) component of groundwater flow in this area.

Figure 3-2 shows the water table groundwater contour map with an overlay showing the approximate extent of residuals from the RI Report (MDEQ 2008a). The figure illustrates capture by Portage Creek of the shallow groundwater that could potentially be impacted by residuals at the Allied OU.

The subsurface investigation activities completed at the Allied OU, as described in the RI Report and illustrated by flow nets constructed along several cross-sections (MDEQ 2008a), have demonstrated the significant influence of vertical gradients on groundwater flow, and the potential for flow, between the various flow zones within the surficial aquifer unit. For this reason, and due to the fact that the well screen intervals of the monitored wells tend to be shallow, groundwater contour figures were not constructed at depth. Instead, the water table contour maps described above were constructed using data from wells that are screened at or near the water table surface and therefore provide comparable data points. To evaluate flow patterns at greater depth, vertical gradients were assessed, as described in Section 3.3.

Monitoring well screen depth information relative to the water table was reviewed to select data points to provide data representative of the shallow groundwater surface. The data points used to generate the water table contour figure are identified in Table 2-3.

Strebor operates several shallow groundwater recovery wells at the adjacent property northwest of the Allied OU disposal units, and to evaluate the degree of influence the pumping wells have on groundwater flow in this area, a subset of wells in this portion of the study area was gauged on July 2, 2009, following shut down of the pumping wells on July 1, 2009 for maintenance. As shown by a comparison of the central portion of Figure 3-1 (groundwater flow during operation of the Strebor wells) and Figure 3-3 (groundwater flow when the recovery system is not operating), the impact of the pumping wells on the pattern of groundwater flow is minimal. Drawdowns of 0.84 and 0.86 feet, respectively, were observed at Strebor wells MW-2 (located at the northern end of the Panelyte property) and MW-21 (located west of the Strebor property and the railroad tracks) (Figure 3-3).

The surface water elevation measurement made at the Reed Avenue bridge over Portage Creek (SG-6) was unexpectedly high, at an elevation of 763.41 feet above mean sea level (amsl). A groundwater elevation of 761.59 feet amsl was measured at the nearest shallow monitoring well, MW-14, located approximately 200 feet south on the Performance Paper property. This difference in hydraulic head suggests that surface water could locally be discharging to groundwater in this area. However, due to the distance of this area from the Allied OU (over 1400 feet from the northernmost extent of the residuals), this flow condition, if present, would not change the interpreted groundwater flow patterns at the portion of the Allied OU identified with residuals.

The data collected during this monitoring event were found to correspond well with the data presented in the RI Report, and further illustrate that pumping activities associated with the neighboring Strebor property do not change the pattern of groundwater flow within the surficial aquifer in the area. The collection of additional time series water level data was not deemed necessary due to the strength and consistency of the data.

3.2 Groundwater Flow in the Regional Aquifer Unit

Based on the groundwater modeling efforts completed by the USGS and the City (USGS 2004; City of Kalamazoo 1999), flow in the regional aquifer unit approximately 50 to 80 feet below the ground surface is to the north, toward the Kalamazoo River. Three Strebor monitoring wells included in the groundwater investigation are screened in the regional aquifer unit. The water levels measured in the three wells were above the top of the aquitard that separates the surficial and regional aquifers, indicating confined conditions in this lower zone. Due to the

upward pressure exerted by the groundwater present in the regional aquifer, the downward flow of groundwater from the surficial aquifer monitored at the Allied OU to the deeper regional aquifer is highly improbable.

3.3 Vertical Flow Gradients

Two flow nets have been constructed using the June 2009 data at the locations shown on Figure 3-4. These figures depict groundwater flow in the vertical as well as the horizontal direction. The flow nets shown on Figures 3-5 and 3-6 illustrate downward gradients in the shallow fill areas (recharge areas) of the Allied OU at a distance from Portage Creek, primarily lateral flow moving toward the creek, and upward flow as the groundwater discharges to surface water.

Water elevation versus time plots for clustered wells screened at different depths were developed to assess the variation over time in vertical flow potentials between various monitored zones at specific locations. From the data collected during this groundwater investigation, three monitoring well clusters on the Allied OU property and three Strebor monitoring well clusters were selected to be depicted graphically. Figure 3-7 shows the location of the well clusters. The selection of these wells was based on spatial distribution, availability of data, and the unit of interest to be assessed.

For the Allied OU well clusters, historical data from 2006 through the present have been added to the graphs to show variations over time. Figure 3-8 illustrates data for the MW-122AR, MW-122A, MW-122B, and MW-212 monitoring well cluster. The monitoring wells in this cluster are screened at various depths within the surficial aquifer. Portage Creek water level elevations are also shown for comparison. This graph illustrates that the highest groundwater levels are observed in the upper sand, and shows a downward flow potential from the upper sand to the intermediate sand. Most importantly, the graph shows an upward gradient of approximately 0.10 feet from the lower sand unit to the intermediate sand unit. Discharge from this zone is to Portage Creek, present at the lowest elevation potential.

The graph shown on Figure 3-9 for the MW-204B, OW-2B, OW-2P, OW-2A shows a similar pattern of flow with discharge to Portage Creek at the lowest elevation; however, in this instance, the highest measured water level is in monitoring well MW-204B, which is screened in the lower sand unit of the surficial aquifer unit, indicating a strong upward gradient of approximately 0.27 feet from the lower sand unit to the upper sand unit that discharges to Portage Creek.

The third graph of data, shown on Figure 3-10, depicts data for the MW-22B, MW-10, MW-22AR, and OW-12A monitoring well cluster. In this instance, the elevation of Portage Creek is higher than the majority of measured groundwater elevations, potentially suggesting flow from or below the creek. However, this well cluster is located within approximately 25 feet of the groundwater extraction system behind the sheet pile wall. Note that the shallower wells (MW-10, MW-22AR, and OW-12A), screened in closest proximity to the recovery well points, show the most pronounced drawdown due to the influence of the groundwater removal. Importantly, the deepest well (MW-22B) generally has the highest water level, indicating an upward gradient at this location. One inconsistent measurement, collected in December 2008 at monitoring well MW-22B, shows the opposite condition; however, this data point is an anomalous outlier, varying by 3.6 feet from the average of the elevations measured from 2006 through the present at that well.

The City expressed concern that monitoring well MW-122B might be installed in the regional aquifer that is used by the City's Central Well Field, and that a downward flow gradient – as historically measured at this location relative to the shallow sand of the surficial aquifer – might direct flow of groundwater from the Allied OU to the regional aquifer. However, as shown on Figure 2-3, the screen for this well is clearly within the surficial aquifer, and well above the aquitards that separate the surficial aquifer from the lower regional aquifer. Therefore, this well will not direct flow to the regional aquifer used by the City's Central Well Field.

The City also communicated concerns that recent groundwater elevation measurements at shallow monitoring wells MW-122A and MW-122AR are conspicuously lower than measurements made historically (e.g., 2000), and that the head difference between these shallow wells and monitoring well MW-122B, screened in the lower sand unit of the surficial aquifer, is reduced from over 3 feet to a fraction of a foot. They observed that water elevation measurements at this well cluster (along with MW-122B) currently show an upward gradient where historically there was a downward gradient between the upper and lower sand units of the surficial aquifer at this location.

The differences in groundwater elevations and gradients between now and 2000 are due to this area having been covered with an impermeable cap in 2004. The MW-122-series well cluster is located in the berm immediately adjacent to Former Residuals Dewatering Lagoon (FRDL) #1, which currently and historically has been the location to which surface water runoff drains within the 22-acre Bryant HRDL/FRDLs disposal area. However, in 2000 this lagoon was unlined and any accumulated water was free to drain into the adjacent sandy berm and the shallow groundwater system, raising groundwater elevations in the immediate vicinity. In 2004, this lagoon was double-lined with an impermeable cap designed in

accordance with Michigan Act 451 Part 115 solid waste regulations. As a result, surface water runoff that collects in this area is prevented from entering the groundwater system, and is discharged directly to Portage Creek. Consequently, groundwater elevations at MW-122A and MW-122AR have dropped. Note that PCBs were not detected in any groundwater samples collected from MW-122B for the RI, and inorganics were detected only at levels below MDEQ groundwater criteria, providing additional empirical evidence that groundwater does not flow downward at this location.

The monitoring well clusters at the Strebor property provide important information, as each of the three well clusters includes one well screened in the surficial aquifer unit and a second well screened in the regional aquifer unit, providing data regarding the potential for flow between the two units. Figure 3-11 illustrates the relative groundwater elevations in all three of the Strebor well clusters. At each of the three well cluster locations, there is a strong upward gradient between the regional aquifer unit and the surficial aquifer unit. For the MW-40/MW-30 well cluster, quarterly data are available for a period of 3 years, and the gradient remains consistently upward. As mentioned previously, all of the deep Strebor wells demonstrate confined conditions and one of the monitoring wells, MW-39, exhibits flowing artesian conditions. A pressure gauge was installed at the well head of MW-39 to allow for conversion of the measured pounds per square inch to feet of water. These data illustrate hydraulic disconnection between the surficial aquifer unit and the regional aquifer unit.

The results of the analysis of groundwater flow patterns, directions and gradients clearly support the RI Report conclusion that shallow groundwater at the Allied OU discharges to Portage Creek, and no additional data were obtained that suggest that there is a pathway to the regional aquifer used for the City Central Well Field. With this understanding, no further analysis was deemed necessary with respect to the distribution of inorganic constituents in onsite or offsite groundwater.

3.4 *Refined Conceptual Site Model*

The data collected during this investigation strongly support the Conceptual Site Model identified in the RI Report and provide a basis for a refined understanding of groundwater flow at the Allied OU and local environs. The groundwater elevation data acquired for the Supplemental Groundwater Study reflect current conditions at the Allied OU with the impermeable cap over the Bryant HRDL/FRDLs extended over the settling basin (FRDL #1), and therefore update the groundwater data, flow maps, and flow net information presented in the RI Report (MDEQ 2008). The updated data confirm that shallow groundwater within the surficial aquifer unit flows toward and discharges to Portage Creek, and that pumping at the Allied OU from behind the sheet pile has a mild influence on this flow pattern. North of Alcott

Street, the impact of the concrete-lined segment of the creek appears to mitigate the degree of capture of the shallow groundwater by the creek, and a northerly flow component is present. However, as indicated by MDEQ studies on the Performance Paper property (Malcolm Pirnie, Inc. 2004) and as shown clearly on Figure 3-2, PCB-containing residuals are not present in groundwater in this area. Overlaying the potential extent of PCBs or residuals with the groundwater flow map illustrates that Portage Creek serves as a discharge point for potentially impacted groundwater associated with the residuals at the Allied OU.

Similar to observations at the Allied OU, pumping directly from the surficial aquifer at the neighboring Strebor property has also been shown to result in minimal changes to the water table surface, and does not change the pattern of groundwater flow in the area.

The regional aquifer unit exists under confined conditions below the Allied OU, and a substantial upward gradient is present. An upward pressure gradient of 0.1 to 0.2 feet/feet exists between the regional aquifer at depth and the surficial aquifer monitored at the Allied OU mitigates the potential for the downward migration of groundwater from the surficial aquifer unit to the regional aquifer unit. The presence of confined conditions also minimizes the influence of pumping at the Central Well Field on the surficial aquifer at the Allied OU. In order to influence water levels in the surficial aquifer at the Allied OU, the upward gradient observed between the lower regional aquifer and the shallow surficial aquifer would have to be reversed. The hydraulic condition (e.g., excessive pumping) that would be required to reverse an upward gradient of 0.1 to 0.2 feet/feet between the regional and surficial aquifers over a distance of more than 2000 feet between the City's Central Well Field and the Allied OU is judged to be extremely unlikely. Differential effects of precipitation on recharging the regional and surficial aquifer systems are expected to be minimal.

3.5 Study Limitations

Although a robust data set exists for the surficial aquifer system, a limited number of wells were used to evaluate groundwater flow paths and gradients associated with the regional aquifer. If the information from these well provided ambiguous results, there might be reason to conduct further investigation into the regional aquifer conditions. However, the consistent observation of considerable upward gradients demonstrated by the well clusters in the surficial and regional aquifers over an extended period of time suggest that these conditions are likely to be laterally extensive, and representative of conditions over the long term, suggesting that no additional information is needed.

4. Findings

The Supplemental Groundwater Investigation, together with prior data, provides a basis to conclude that a groundwater pathway is not present from the Allied OU to the City Central Well Field. The key findings are summarized below, followed by a discussion of other relevant information that collectively reduce any remaining uncertainty in this conclusion.

- Groundwater table contour maps constructed for the water table show that gradients in the shallow aquifer are directed toward Portage Creek and are in an easterly, onsite direction along the western boundary of the Allied OU, with a northerly component of flow at the north end of the site near the dam (see Figure 3-1).

- The groundwater contour maps together with vertical flow nets (See Figures 3-1, and 3-3 through 3-6) indicate that Portage Creek is the discharge point for shallow groundwater at the Allied OU.

- Vertical gradients measured at three monitoring well clusters at the Allied OU screened at different depth intervals within the surficial aquifer show strong upward gradients relative to Portage Creek, and strong upward gradients from the lower sand to the shallow intermediate sand unit within the surficial aquifer. Monitoring wells at the Allied OU do not extend into the regional aquifer present at depth.

- Data for three shallow and deep well pairs previously installed by Strebor provide groundwater elevation data for both the surficial aquifer and the deeper regional aquifer, and indicate a strong upward gradient (i.e., upward flow potential) from the regional aquifer to the surficial aquifer.

These findings indicate that a groundwater flow pathway for PCBs and inorganics at the Allied OU to the City's Central Well Field is not present because: a) shallow groundwater flows to the east toward Portage Creek and not in a northwesterly offsite direction, and b) the flow potential between the deeper regional aquifer and the shallower surface aquifer is directed upward. If there is flow between these two units at the Allied OU, the available data indicate it would be upward into the shallow aquifer, with subsequent discharge to Portage Creek.

Although these findings demonstrate that the local hydrogeology indicates that groundwater at the Allied OU does not pose a threat to the City's Central Well Field, further confidence in this conclusion is lent through a review of PCB fate and transport considerations and other available information, as summarized below.

- PCBs are hydrophobic (meaning they do not readily dissolve in water and preferentially attach to soil particles) and as a result, are typically present in only very low concentrations in groundwater, especially groundwater not in immediate contact with PCB-containing materials. As a result, PCBs are not typically detected in any significant quantity in wells that are screened outside of the limits of PCB-containing residuals.

- Generally speaking, PCBs have not been observed in groundwater at levels above criteria away from the Allied OU, and detections above MDEQ criteria are observed only in the immediate vicinity of or in contact with residuals.

- The low hydraulic conductivity of residuals is also an important factor in the limited mobility of PCBs. Groundwater does not readily pass through these clay-like materials.

- The groundwater collection and treatment system currently operating at the Allied OU collects groundwater from the downgradient perimeter of the Bryant HRDL/FRDLs area. Of 38 samples of the influent to the treatment system that were collected over the period from March 2006 to present, only one sample contained a detectable concentration of PCBs The detection was reported at the detection limit of 0.1 ug/L, which is below MDEQ's GSI criterion. No PCBs were detected in the other 37 (97 percent of samples).

- Two groundwater flow models completed for the Kalamazoo area (City of Kalamazoo 1999; USGS 2004) identify and simulate horizontal "confining" units that extend beneath the Allied OU. The confining unit that separates the surficial aquifer system monitored at the Allied OU and the regional aquifer system tapped by the City Central Well Field was encountered in the vicinity of the northern portion of the Allied OU in monitoring wells installed at the neighboring Strebor property. This confining layer is partially responsible for the upward pressure of the deeper regional aquifer into the overlying surficial aquifer, and its presence tends to limit communication of groundwater between these two aquifers.

- Routine monitoring data collected by the City of Kalamazoo from the Central Well Field show that PCBs have not been detected. Recent tests using lower detection limits confirm historical findings that PCBs are not present. Conditions at the Allied OU are not conducive to migration of groundwater from the Allied OU toward the City Central Well Field, and it is reasonable to conclude that they do not pose a threat to the City's well supply.

5. References

ARCADIS. 2009. Groundwater Evaluation and Work Plan for Supplemental Investigation, Allied Paper, Inc./Kalamazoo River/Portage Creek Superfund Site. April 28, 2009.

Bay West. 1990. *Remedial Investigation/Feasibility Study Work Plan.* June 1990.

Bay West. 1991. *Remedial Investigation/ Feasibility Study* for Strebor Inc. July 1991.

Bay West. 1993. *Draft Remedial Action Plan* for Strebor, Inc. October 1993.

CH2M Hill, 2009. *Summarization of Preliminary Remediation Goals Kalamazoo River/Portage Creek OU1 Site.* Technical Memorandum, March 21. 2009.

City of Kalamazoo. 1999. *The Water Pumping Stations 1, 2, 3, 4, & 7, Groundwater Flow Model and Capture Zone Delineations Report.* November, 1999.

City of Kalamazoo. 2008a. *Interim Technical Responses to the Allied Paper Operable Unit Kalamazoo, Michigan Remedial Investigation Report.* September 17, 2008.

City of Kalamazoo 2008b. Data transmittal via e-mail from Bruce Merchant (City of Kalamazoo) to Michael Berkoff (USEPA) and Suda Arakere (MHLLC). September 29, 2008.

Environmental Consulting & Technology, Inc. (ECT). 2006. *Impacted Materials Assessment and Portage Creek Channel Restoration Summary Report for Performance Paper Site, 315, 405, and 505 E. Alcott Street, Kalamazoo, Michigan.* June 2006.

Landmark Environmental and Engineering Solutions (Landmark). 2004. *Limited Remedial Investigation Report, Former Panelyte Facility, 2403 South Burdick Street, Kalamazoo, Michigan.* January 13, 2004.

MACTEC Engineering and Consulting of Michigan, Inc. (MACTEC). 2003. *Technical Memorandum No. 1 Remedial Investigation, Performance Paper Site, Kalamazoo, Michigan.* April 2003.

Malcolm Pirnie, Inc. 2004. *Preliminary Site Assessment Report, Former Panelyte Site, Kalamazoo, Michigan.* December 8, 2004.

MDEQ. 2004. RRD Operational Memorandum No. 5. September 30, 2004.

MDEQ. 2008a. *Remedial Investigation Report for the Allied Paper, Inc. Operable Unit.* March 2008.

MDEQ. 2008b. MDEQ interoffice communication from Brant Fisher to Paul Bucholtz. April 30, 2008.

U.S. Department of Health and Human Services. 2000. Toxicological Profile for Polychlorinated Biphenyls (PCBs), U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry , November 2000.

USEPA. 1979. Water-related environmental fate of 129 priority pollutants, Vol. I. Washington, DC: U.S. Environmental Protection Agency, 36-1 to 36-18. EPA 440/4-79-029a.

USGS, 2004. *Simulation of the Ground-Water-Flow System in the Kalamazoo County Area, Michigan, Scientific Investigations Report* 2004-5054.

ARCADIS

Tables

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table 2-1 -- Allied OU - Monitoring Well Construction Data

Well/ Piezometer	Date Installed	Aquifer Unit	Total Depth of Monitoring Well (feet bgs)	Top of Casing Elevation (feet AMSL)	Ground Surface Elevation (feet AMSL)	Elevation of Bottom of Screen (feet AMSL)	Elevation of Top of Screen (feet AMSL)	Elevation of Mid Point of Screen (feet AMSL)	Elevation of Top of Filter Pack (feet AMSL)	Elevation of Top of Bentonite (feet AMSL)	Hydrostratigraphic Unit Screened Within Surficial Aquifer Unit (Units as Defined in RI)
FW-101	6/10/2002	Surficial	5.0	800.36	797.3	793.1	795.3	794.2	796.3	797.3	Upper Sand
GWE-1	2/10/2000	Surficial	25.5	803.21	802.7	782.0	791.8	786.9	794.8	796.8	Upper Sand/Peat/Upper Aquitard
GWE-1A	5/4/2000	Surficial	35.0	806.07	806.6	776.8	791.7	784.2	792.8	795.6	Upper Sand/Upper Aquitard
GWE-1P	2/10/2000	Surficial	NA	803.03	NA	NA	NA	NA	NA	NA	NA
GWE-4A	6/20/2000	Surficial	34.4	805.27	805.7	771.3	781.2	776.3	784.2	801.7	Upper Sand
MW-5R	3/26/1998	Surficial	26.1	811.87	810.1	783.6	789.6	786.6	789.6	792.1	Peat/Upper Sand
MW-6	11/16/1985	Surficial	25.0	812.70	810.7	785.7	788.7	787.2	790.7	809.7	Upper Sand
MW-7	11/16/1985	Surficial	31.0	818.94	817.4	786.4	789.4	787.9	791.4	816.4	Upper Sand
MW-8A	8/10/1993	Surficial	18.0	810.74	809.0	791.0	796.0	793.5	796.0	799.0	Peat/Upper Sand/Upper Aquitard
MW-22AR	4/1/1998	Surficial	16.5	805.79	807.5	791.0	796.0	793.5	796.5	798.5	Upper Sand/Peat
MW-22B	8/11/1993	Surficial	48.0	809.25	804.6	757.6	762.6	760.1	764.6	767.6	Intermediate/Lower Sand[2]
MW-23R	10/19/2000	Surficial	25.0	809.33	804.0	779.0	784.0	781.5	786.0	793.0	Sand[3]
MW-24R	3/27/1998	Surficial	24.0	803.37	806.6	782.6	787.6	785.1	788.6	791.1	Upper Sand/Upper Aquitard
MW-26	8/25/1989	Surficial	9.0	792.10	790.0	781.0	784.0	782.5	784.0	789.0	Upper Sand
MW-120A	7/28/1993	Surficial	23.5	822.21	819.6	796.1	801.1	798.6	801.4	804.6	Residuals/Upper Sand
MW-120B	7/27/1993	Surficial	30.5	821.85	819.4	788.9	793.9	791.4	793.9	796.9	Upper Sand
MW-122A	8/6/1993	Surficial	21.5	806.45	803.4	781.9	791.9	786.9	794.0	797.4	Upper Sand/Peat
MW-122AR	3/31/1998	Surficial	19.3	807.25	804.0	784.7	794.7	789.7	795.9	800.0	Upper Sand/Peat
MW-122B	8/4/1993	Surficial	60.3	806.58	803.6	743.3	748.3	745.8	750.4	753.6	Lower Sand
MW-124A	8/23/1993	Surficial	36.0	843.74	841.3	805.3	815.3	810.3	817.3	820.3	Upper Sand
MW-124B	8/19/1993	Surficial	59.0	844.43	842.1	783.1	788.1	785.6	790.1	793.6	Upper Sand
MW-125A	8/22/1993	Surficial	25.0	810.05	807.7	783.2	788.2	785.7	788.3	791.3	Upper Sand/Peat
MW-126A	7/21/1993	Surficial	20.5	805.68	802.8	782.3	787.3	784.8	787.3	790.3	Upper Sand
MW-126AR	4/1/1998	Surficial	21.5	805.12	803.6	782.1	787.1	784.6	787.8	790.6	Upper Sand
MW-16B	6/13/1988	Surficial	33.0	803.26	801.9	768.9	771.9	770.4	773.9	800.9	Intermediate Sand
MW-19BR	8/20/1993	Surficial	39.0	822.06	819.5	780.5	785.5	783.0	787.5	790.3	Upper Aquitard[4]
MW-200A	10/4/2000	Surficial	15.8	803.73	800.9	785.1	790.1	787.6	791.9	793.9	Sand[3]
MW-201B	10/5/2000	Surficial	28.0	802.20	800.3	772.3	777.3	774.8	779.3	783.3	Sand[3]
MW-202B	9/24/2000	Surficial	35.0	803.73	801.1	767.9	772.6	770.3	774.6	778.1	Sand[3]
MW-203B	9/23/2000	Surficial	23.7	801.97	798.3	774.7	779.4	777.0	781.0	792.3	Sand[3]
MW-204B	10/9/2000	Surficial	84.0	807.05	800.6	716.6	721.6	719.1	727.0	745.6	Lower Sand
MW-205B	10/11/2000	Surficial	64.0	805.72	799.5	735.5	740.5	738.0	742.5	797.5	Lower Sand
MW-206A	6/10/2002	Surficial	12.0	800.85	797.7	785.7	790.7	788.2	791.2	795.7	Sand[3]
MW-207	5/31/2002	Surficial	33.0	805.00	797.9	765.3	769.9	767.6	771.9	774.9	Intermediate/Lower Sand[2]
MW-208	5/30/2002	Surficial	23.0	804.42	796.3	773.3	778.3	775.8	780.3	783.8	Intermediate/Lower Sand[2]
MW-209	6/17/2002	Surficial	33.0	792.40	787.0	754.0	759.0	756.5	761.0	764.0	Intermediate Sand

See Notes on Page 3

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table 2-1 -- Allied OU - Monitoring Well Construction Data

Well/ Piezometer	Date Installed	Aquifer Unit	Total Depth of Monitoring Well (feet bgs)	Top of Casing Elevation (feet AMSL)	Ground Surface Elevation (feet AMSL)	Elevation of Bottom of Screen (feet AMSL)	Elevation of Top of Screen (feet AMSL)	Elevation of Mid Point of Screen (feet AMSL)	Elevation of Top of Filter Pack (feet AMSL)	Elevation of Top of Bentonite (feet AMSL)	Hydrostratigraphic Unit Screened Within Surficial Aquifer Unit (Units as Defined in RI)
MW-210	6/5/2002	Surficial	18.1	806.55	797.0	779.0	784.0	781.5	785.0	789.0	Sand[3]
MW-211	6/17/2002	Surficial	28.6	793.15	788.1	759.9	764.6	762.3	766.6	769.6	Intermediate Sand
MW-212	6/18/2002	Surficial	17.3	791.52	786.8	769.9	774.6	772.3	776.8	780.8	Intermediate Sand
MW-213	7/3/2002	Surficial	21.0	791.73	787.4	766.8	771.4	769.1	773.4	776.4	Intermediate Sand
MW-214	7/8/2002	Surficial	30.0	803.66	794.2	764.6	769.2	766.9	770.2	772.3	Upper Aquitard/Intermediate Sand
MW-215	3/31/2003	Surficial	6.0	790.56	783.6	777.8	782.6	780.2	783.1	784.6	Upper Sand
MW-216	3/28/2003	Surficial	9.6	790.54	783.6	774.2	779.0	776.6	779.5	781.6	Upper Sand
MW-217	3/28/2003	Surficial	9.6	790.79	783.2	774.7	776.7	775.7	777.2	780.2	Peat/Upper Sand
MW-218	3/28/2003	Surficial	12.0	790.73	783.5	771.7	776.5	774.1	777.0	780.5	Upper Sand
MW-219	3/28/2003	Surficial	13.5	790.97	788.9	775.6	780.4	778.0	780.9	784.9	Upper Sand
MW-220	3/31/2003	Surficial	6.0	790.81	785.9	780.1	784.9	782.5	785.4	786.9	Upper Sand
MW-221R	4/8/2003	Surficial	8.0	791.11	785.9	778.0	779.9	778.9	780.4	783.9	Upper Sand
MW-222	4/3/2003	Surficial	10.0	797.32	792.8	783.2	787.8	785.5	788.3	791.8	Peat/Upper Sand
MW-223	4/3/2003	Surficial	9.0	797.91	794.3	785.3	788.2	786.8	793.6	795.3	Upper Sand
MW-224	3/12/2003	Surficial	24.0	813.28	810.3	786.7	791.3	789.0	793.3	796.7	Upper Sand
MW-225	3/7/2003	Surficial	9.5	792.94	789.4	780.3	784.9	782.6	785.4	787.9	Upper Sand
MW-226	3/3/2003	Surficial	2.0	790.67	783.8	781.8	783.8	782.8	783.9	784.8	Upper Sand
MW-227	3/28/2003	Surficial	2.0	790.66	782.1	780.1	782.1	781.1	782.2	783.1	Upper Sand
MW-228	3/28/2003	Surficial	3.0	790.98	783.4	780.4	783.4	781.9	783.5	784.4	Upper Sand
MW-229	3/28/2003	Surficial	4.0	791.33	784.3	780.3	784.3	782.3	784.4	785.3	Upper Sand
MW-230	4/3/2003	Surficial	4.0	790.88	785.9	781.9	785.9	783.9	786.0	786.9	Upper Sand
MW-231	3/31/2003	Surficial	22.0	790.66	785.9	764.1	768.9	766.5	770.1	772.6	Intermediate Sand
MW-232	3/31/2003	Surficial	12.0	790.64	785.3	773.3	776.3	774.8	777.0	781.3	Upper Sand
OW-1A	2/17/2000	Surficial	20.5	803.08	806.7	786.3	788.3	787.3	788.8	792.2	Upper Sand
OW-1P	2/21/2000	Surficial	14.9	803.43	803.6	788.8	797.8	793.3	798.6	801.6	Upper Sand
OW-2A	2/22/2000	Surficial	18.5	804.01	804.6	786.2	788.1	787.2	788.5	791.6	Upper Sand/Upper Aquitard
OW-2B	2/21/2000	Surficial	34.4	803.80	804.4	770.4	775.2	772.8	776.9	780.2	Intermediate Sand/Lower Aquitard
OW-2P	2/22/2000	Surficial	15.5	804.21	804.7	789.3	794.1	791.7	795.2	797.9	Upper Sand
OW-3AR	9/28/2000	Surficial	15.0	803.91	799.1	784.1	788.7	786.4	790.1	792.1	Upper Sand
OW-3PR	9/28/2000	Surficial	8.4	807.21	798.9	790.9	795.7	793.3	796.6	797.9	Upper Sand/Peat
OW-4AR	9/27/2000	Surficial	25.0	809.41	804.2	779.2	783.8	781.5	785.2	786.7	Sand[3]
OW-4PR	6/25/2002	Surficial	8.4	811.26	801.4	793.0	800.5	796.8	800.5	801.4	Upper Sand
OW-5P	3/2/2000	Surficial	21.4	816.52	817.4	796.1	800.9	798.5	802.8	805.4	Upper Sand
OW-6A	3/3/2000	Surficial	31.9	817.32	818.2	786.3	791.1	788.7	792.4	794.7	Sand[3]
OW-6P	3/7/2000	Surficial	21.5	817.40	818.2	796.8	801.6	799.2	803.8	805.9	Residuals/Upper Sand

See Notes on Page 3

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table 2-1 -- Allied OU - Monitoring Well Construction Data

Well/ Piezometer	Date Installed	Aquifer Unit	Total Depth of Monitoring Well (feet bgs)	Top of Casing Elevation (feet AMSL)	Ground Surface Elevation (feet AMSL)	Elevation of Bottom of Screen (feet AMSL)	Elevation of Top of Screen (feet AMSL)	Elevation of Mid Point of Screen (feet AMSL)	Elevation of Top of Filter Pack (feet AMSL)	Elevation of Top of Bentonite (feet AMSL)	Hydrostratigraphic Unit Screened Within Surficial Aquifer Unit (Units as Defined in RI)
OW-7PR	6/14/2000	Surficial	16.8	806.02	805.9	789.4	794.2	791.8	794.9	796.9	Upper Sand
OW-9PR	9/26/2000	Surficial	10.0	811.50	801.1	791.1	796.1	793.6	798.1	799.6	Upper Sand/Peat
OW-11A	10/7/2000	Surficial	18.5	804.01	799.4	781.2	785.9	783.6	787.9	789.9	Upper Sand
OW-12A	9/1/2000	Surficial	24.4	807.73	803.9	779.7	784.4	782.0	785.9	802.9 [1]	Upper Sand
OW-13A	10/3/2000	Surficial	14.8	800.77	798.0	783.4	786.2	784.8	787.0	788.5	Upper Sand
OW-14P	5/31/2002	Surficial	8.0	804.16	795.8	788.0	792.8	790.4	793.3	795.8	Upper Sand/Upper Aquitard
OW-15P	6/26/2002	Surficial	16.7	813.78	809.3	792.7	797.6	795.1	799.6	802.1	Upper Sand
OW-16P	6/26/2002	Surficial	7.1	806.06	797.7	790.7	795.6	793.1	796.7	797.7	Upper Sand
OW-17P	6/26/2002	Surficial	6.5	803.56	794.0	787.6	792.5	790.0	793.0	794.0	Upper Sand

Notes:

[1] Depth to top of grout; bentonite not present.

[2] The hydrostratigraphic unit screened is identified as lower sand or intermediate/lower sand; however, note that these unit descriptions refer to the lower portion of the *surficial* aquifer.

[3] Intervening clay layers are absent beneath the peat in this area of the Allied OU; therefore, the upper, intermediate and lower sand units can be thought of as one hydrostratigraphic unit within the surficial unit.

[4] Screens a sand seam within the upper aquitard.

RI = Remedial Investigation.

bgs = below ground surface.

AMSL = above mean sea level.

Elevations are based on the existing Allied OU site control, which is referenced to the National Geodetic Vertical Datum (NGVD) of 1929.

TOC = Top of casing

Aquifer Unit designations are based on aquifer descriptions in Figure 2 from the April 30, 2008 MDEQ Memorandum from Brant Fisher to Paul Bucholtz.

Well construction data from 2008 Remedial Investigation Report (CDM, 2008), total depth of monitoring wells was added based on well construction logs.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table 2-2 -- Neighboring Properties - Monitoring Well Construction Data

Well Number	Boring Log Available	Date Installed	Top of Casing Elevation (feet AMSL)[1]	Ground Elevation (feet AMSL)[1]	Screened Interval (feet bgs)	Top of Screen (feet AMSL)[1]	Bottom of Screen (feet AMSL)[1]	Aquifer Unit
Strebor Property								
MW-1	No	NA	802.79	801.2	11 - 16	790.2	785.2	Surficial
MW-7	No	NA	795.28	793.2	7 - 12	786.2	781.2	Surficial
MW-15	No	NA	797.23	796.2	5.5 - 10.5	790.7	785.7	Surficial
MW-21	No	NA	794.63	792.8	5 - 10	787.8	782.8	Surficial
MW-24	Yes	9/1/1987	799.97	797.6	5.3 - 13.1	792.3	784.5	Surficial
MW-25	Yes	9/7/1987	795.04	792.9	22.3 - 27.1	775.3	765.8	Surficial
MW-30	Yes	11/5/1987	796.32	793.8	9.7 - 14.7	784.1	779.1	Surficial
MW-35	Yes	11/13/1988	794.88	792.0	15.3 - 20.3	776.7	771.7	Surficial
MW-36	Yes	9/17/1990	788.55	785.7	2 - 12	783.7	773.7	Surficial
MW-37	Yes	9/18/1990	788.28	785.9	82 - 87	703.9	698.9	Regional
MW-38	Yes	9/19/1990	781.50	779.2	2.2 - 12.2	777.0	767.0	Surficial
MW-39	Yes	9/20/1990	781.55	778.9	80.5 - 85.5	698.4	693.4	Regional
MW-40	Yes	9/2/1990	796.51	794.1	87 - 92	707.1	702.1	Regional
Panelyte Property								
MW1	Yes	5/23/2002	797.16	794.6	7 - 17	787.6	777.6	Surficial
MW2	Yes	5/22/2002	795.98	793.6	5 - 15	788.6	778.6	Surficial
MW3	Yes	5/22/2002	799.44	797.0	6 - 16	791.0	781.0	Surficial
MW4	Yes	5/23/2002	795.33	793.0	4 - 14	789.0	779.0	Surficial
MW5	Yes	5/24/2002	795.05	792.5	2 - 12	790.5	780.5	Surficial
MW6	Yes	5/28/2002	792.70	795.0	4 - 14	791.0	781.0	Surficial
MW7	Yes	5/28/2002	795.40	793.3	4 - 14	789.3	779.3	Surficial
MW8	Yes	5/21/2002	795.90	793.3	6 - 16	787.3	777.3	Surficial
MW9	Yes	5/20/2002	781.11	778.9	1 - 3.5	777.9	775.4	Surficial
MW10	Yes	5/20/2002	781.56	779.1	4 - 5.7	775.1	773.4	Surficial
MW11	Yes	5/20/2002	782.95	780.8	3 - 5.5	777.8	775.3	Surficial
Performance Paper Property								
ATL-03	Yes	8/11/1990	777.38	773.6	10.2 - 15.2	763.4	758.4	Surficial
ATL-04	Yes	8/11/1990	780.27	777.6	19.7 - 24.7	757.9	752.9	Surficial
ATL-05	Yes	8/11/1990	773.42	769.9	9.6 - 14.6	760.3	755.3	Surficial
MW2-02	No	NA	783.40	781.0	13.1 - 18.1	767.9	762.9	Surficial
MW-3	No	NA	NA	NA	5 - 15	NA	NA	Surficial
MW3-01	No	NA	777.44	775.3	22 - 27	753.3	748.3	Surficial
MW3-02	No	NA	777.81	775.6	8.7 - 13.7	766.9	761.9	Surficial
MW3-04	No	NA	776.07	776.2	17.7 - 22.7	758.5	753.5	Surficial
MW-4	No	NA	NA	NA	15 - 25	NA	NA	Surficial
MW-5	No	NA	NA	NA	5 - 15	NA	NA	Surficial
MW-6	No	NA	780.27	777.7	13 - 23	764.7	754.7	Surficial
MW-7	No	NA	783.72	780.8	15 - 25	765.8	755.8	Surficial
MW-9	No	NA	787.64	784.8	15.4 - 20.4	769.4	764.4	Surficial
MW-10D	No	NA	781.52	778.5	33.6 - 38.6	744.9	739.9	Surficial
MW-10S	No	NA	780.73	778.1	10.9 - 15.9	767.2	762.2	Surficial

See Notes on Page 2.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table 2-2 -- Neighboring Properties - Monitoring Well Construction Data

Well Number	Boring Log Available	Date Installed	Top of Casing Elevation (feet AMSL)[1]	Ground Elevation (feet AMSL)[1]	Screened Interval (feet bgs)	Top of Screen (feet AMSL)[1]	Bottom of Screen (feet AMSL)[1]	Aquifer Unit
Performance Paper Property (Cont.)								
MW-11	No	NA	778.96	776.1	8.3 - 13.3	767.8	762.8	Surficial
MW-12D	No	NA	771.65	768.8	28.7 - 33.7	740.1	735.1	Surficial
MW-12S	No	NA	771.41	768.6	6.4 - 11.4	762.2	757.2	Surficial
MW-13	No	NA	788.40	785.5	19.6 - 24.6	765.9	760.9	Surficial
MW-14	No	NA	767.76	764.5	3.2 - 8.2	761.3	756.3	Surficial
MW-15D	No	NA	779.79	777.1	35.8 - 40.8	741.3	736.3	Surficial
MW-15S	No	NA	779.72	777.2	15.1 - 20.1	762.1	757.1	Surficial
MW-16D	No	NA	777.36	774.5	31.5 - 36.5	743.0	738.0	Surficial
MW-16S	No	NA	776.94	774.5	12.3 - 17.3	762.2	757.2	Surficial
MWB-02	No	NA	783.25	780.5	17.3 - 22.3	763.2	758.2	Surficial
MWB-03	No	NA	NA	NA	20.4 - 25.4	NA	NA	Surficial
MWLTI	No	NA	NA	NA	16.3 - 21.3	NA	NA	Surficial
PW-1	No	NA	789.47	786.4	34.7 - 39.7	751.7	746.7	Surficial
PW-2	No	NA	786.18	783.0	22.1 - 27.1	760.9	755.9	Surficial
PW-3	No	NA	778.22	774.3	11.6 - 16.6	762.8	757.8	Surficial
PW-4	No	NA	775.63	772.6	12.6 - 17.6	760.0	755.0	Surficial
PW-5	No	NA	775.04	772.1	21.6 - 26.6	750.4	745.4	Surficial
PW-6	No	NA	774.24	771.0	24.2 - 29.2	746.9	741.9	Surficial

Notes:
bgs = below ground surface.
AMSL = above mean sea level.
NA = not available.
TOC = Top of casing.
[1] Surveyed by Prein & Newhof in 2009.
Elevations are based on the existing Allied OU site control, which is referenced to the National Geodetic Vertical Datum (NGVD) of 1929.
Aquifer Unit designations are based on aquifer descriptions in Figure 2 from the April 30, 2008 MDEQ Memorandum from Brant Fisher to Paul Bucholtz.
Well Construction information for Performance Paper Property from Impacted Materials Assessment and Portage Creek Channel Restoration Summary Report for Performance Paper Site 315, 405, 505 E. Alcott Street Kalamazoo, Michigan 49001 URS, June 2006.
Well construction information for the Strebor Property from the Remedial Investigation and Feasibility Study for Strebor Inc., Kalamazoo, Inc., by Bay West, Inc., dated 7/24/1991.
Well construction information for Panelyte Site wells is from the Preliminary Site Assessment Report, Former Panelyte Site, Kalamazoo Michigan, Malcolm Pirnie, December 8, 2004.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table 2-3 -- Allied OU and Neighboring Properties - June 25-26, 2009 Groundwater and Surface Water Elevation Data

Well/ Piezometer	Hydrostratigraphic Unit Screened Within Surficial Aquifer Unit (Units as Defined in RI)	Top of Casing Elevation (feet AMSL)	6/25-6/26/09			Locations Used for Water Table Contour Map
			Depth to Water (ft below TOC)	Measured Depth to Bottom (ft below TOC)	Groundwater Elevation (feet AMSL)	
Allied OU						
FW-101	Upper Sand	800.36	4.66	7.51	795.70	X
GWE-1	Upper Sand/Peat/Upper Aquitard	803.21	19.95	24.90	783.26	
GWE-1A	Upper Sand/Upper Aquitard	806.07	18.12	NA	787.95	X
GWE-1P	NA	803.03	5.50	5.51	797.53	
GWE-4A	Upper Sand	805.27	22.65	40.91	782.62	
MW-5R	Peat/Upper Sand	811.87	18.77	28.09	793.10	
MW-6	Upper Sand	812.70	14.09	28.02	798.61	X
MW-7	Upper Sand	818.94	18.64	33.15	800.30	X
MW-8A	Peat/Upper Sand/Upper Aquitard	810.74	11.20	20.31	799.54	X
MW-22AR	Upper Sand/Peat	805.79	17.21	19.06	788.58	X
MW-22B	Intermediate/Lower Sand[1]	809.25	16.87	51.81	792.38	
MW-23R	Sand[2]	809.33	15.68	32.34	793.65	
MW-24R	Upper Sand/Upper Aquitard	803.37	Obstruction			
MW-26	Upper Sand	792.10	4.52	11.35	787.58	
MW-120A	Residuals/Upper Sand	822.21	21.15	26.34	801.06	X
MW-120B	Upper Sand	821.85	22.79	33.20	799.06	
MW-122A	Upper Sand/Peat	806.45	15.63	22.60	790.82	
MW-122AR	Upper Sand/Peat	807.25	15.87	16.70	791.38	X
MW-122B	Lower Sand	806.58	15.55	61.39	791.03	
MW-124A	Upper Sand	843.74	29.12	39.23	814.62	X
MW-124B	Upper Sand	844.43	40.75	61.34	803.68	
MW-125A	Upper Sand/Peat	810.05	16.99	27.14	793.06	X
MW-126A	Upper Sand	805.68	10.11	23.60	795.57	
MW-126AR	Upper Sand	805.12	11.03	23.45	794.09	X
MW-16B	Intermediate Sand	803.26	15.65	35.40	787.61	
MW-19BR	Upper Aquitard[3]	822.06	24.57	39.90	797.49	
MW-200A	Sand[3]	803.73	8.21	18.55	795.52	
MW-201B	Sand[3]	802.20	6.31	30.94	795.89	
MW-202B	Sand[3]	803.73	11.54	40.10	792.19	
MW-203B	Sand[3]	801.97	11.59	31.85	790.38	
MW-204B	Lower Sand	807.05	1.19	93.00	805.86	
MW-205B	Lower Sand	805.72	12.02	71.00	793.70	
MW-206A	Sand[3]	800.85	4.60	15.24	796.25	
MW-207	Intermediate/Lower Sand[1]	805.00	10.10	40.15	794.90	
MW-208	Intermediate/Lower Sand[1]	804.42	13.72	31.08	790.70	
MW-209	Intermediate Sand	792.40	0.00[4]	32.55	NA	
MW-210	Sand[2]	806.55	12.16	27.31	794.39	
MW-211	Intermediate Sand	793.15	1.41	33.53	791.74	
MW-212	Intermediate Sand	791.52	3.21	22.16	788.31	
MW-213	Intermediate Sand	791.73	0.20	25.08	791.53	
MW-214	Upper Aquitard/Intermediate Sand	803.66	16.03	40.06	787.63	
MW-215	Upper Sand	790.56	7.90	12.95	782.66	X
MW-216	Upper Sand	790.54	8.35	16.47	782.19	
MW-217	Peat/Upper Sand	790.79	7.88	17.53	782.91	
MW-218	Upper Sand	790.73	5.02	19.44	785.71	
MW-219	Upper Sand	790.97	6.48	20.41	784.49	
MW-220	Upper Sand	790.81	6.66	10.91	784.15	X
MW-221R	Upper Sand	791.11	9.03	13.31	782.08	
MW-222	Peat/Upper Sand	797.32	3.78	14.41	793.54	
MW-223	Upper Sand	797.91	5.16	9.65	792.75	X
MW-224	Upper Sand	813.28	22.39	27.00	790.89	X
MW-225	Upper Sand	792.94	5.60	12.59	787.34	
MW-226	Upper Sand	790.67	7.21	9.05	783.46	X
MW-227	Upper Sand	790.66	9.11	10.06	781.55	X
MW-228	Upper Sand	790.98	8.07	10.55	782.91	X
MW-229	Upper Sand	791.33	8.09	8.68	783.24	X
MW-230	Upper Sand	790.88	5.76	9.03	785.12	X

See Notes on Page 3.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table 2-3 -- Allied OU and Neighboring Properties - June 25-26, 2009 Groundwater and Surface Water Elevation Data

Well/ Piezometer	Hydrostratigraphic Unit Screened Within Surficial Aquifer Unit (Units as Defined in RI)	Top of Casing Elevation (feet AMSL)	6/25-6/26/09			Locations Used for Water Table Contour Map
			Depth to Water (ft below TOC)	Measured Depth to Bottom (ft below TOC)	Groundwater Elevation (feet AMSL)	
Allied OU (Cont.)						
MW-231	Intermediate Sand	790.66	3.98	28.98	786.68	
MW-232	Upper Sand	790.64	7.48	17.55	783.16	
OW-1A	Upper Sand	803.08	17.10	24.47	785.98	
OW-1P	Upper Sand	Not Located				
OW-2A	Upper Sand/Upper Aquitard	804.01	16.83	20.63	787.18	
OW-2B	Intermediate Sand/Lower Aquitard	803.80	14.04	36.30	789.76	
OW-2P	Upper Sand	804.21	17.15	17.69	787.06	X
OW-3AR	Upper Sand	803.91	16.19	22.13	787.72	
OW-3PR	Upper Sand/Peat	807.21	Dry/Damaged	16.00	NA	
OW-4AR	Sand[2]	809.41	Dry/Damaged	17.76	NA	
OW-4PR	Upper Sand	811.26	14.12	18.63	797.14	X
OW-5P	Upper Sand	816.52	Dry/Damaged	NA	NA	
OW-6A	Sand[2]	817.32	20.90	34.58	796.42	
OW-6P	Residuals/Upper Sand	817.40	18.11	23.96	799.29	X
OW-7PR	Upper Sand	806.02	16.26	19.58	789.76	
OW-9PR	Upper Sand/Peat	811.50	18.85	20.55	792.65	X
OW-11A	Upper Sand	804.01	15.03	22.53	788.98	
OW-12A	Upper Sand	807.73	20.39	32.28	787.34	
OW-13A	Upper Sand	800.77	14.85	21.84	785.92	
OW-14P	Upper Sand/Upper Aquitard	804.16	13.90	16.55	790.26	X
OW-15P	Upper Sand	813.78	17.49	20.40	796.29	X
OW-16P	Upper Sand	806.06	13.41	15.52	792.65	X
OW-17P	Upper Sand	803.56	14.18	16.08	789.38	X
Panelyte Property						
MW1	NA	797.16	8.10	20.04	789.06	X
MW2	NA	795.98	8.85	9.25	787.13	X
[2] The hydrostratigraphic unit screened is identified as lower sand or intermediate/lower sand; however, borings in this area of the Allied OU have not extended to a sufficient depth to locate	NA	799.44	5.25	16.55	794.19	X
MW4	NA	795.33	6.12	16.99	789.21	X
MW5	NA	795.05	6.61	14.90	788.44	X
MW6	NA	792.70	6.63	6.91	786.07	X
MW7	NA	795.40	8.15	9.00	787.25	X
MW8	NA	795.90	5.76	18.82	790.14	X
MW9	NA	781.11	2.39	5.75	778.72	X
MW10	NA	781.56	Damaged			
MW11	NA	782.95	1.95	8.05	781.00	X
Strebor Property						
MW-1	NA	802.79	10.46	NA	792.33	X
MW-7	NA	795.28	8.14	NA	787.14	X
MW-15	NA	797.23	9.11	NA	788.12	X
MW-21	NA	794.63	8.94	NA	785.69	X
MW-24	NA	799.97	9.61	NA	790.36	X
MW-25	NA	795.04	7.94	NA	787.10	
MW-30	NA	796.32	13	NA	783.32	X
MW-35	NA	794.88	9.05	NA	785.83	
MW-36	NA	788.55	9.59	NA	778.96	X
MW-37	NA	788.28	4.93	NA	783.35	
MW-38	NA	781.50	7.73	NA	773.77	X
MW-39	NA	781.55	8.09*	NA	789.64	
MW-40	NA	796.51	5.74	NA	790.77	
Performance Paper Property						
ATL-03	NA	777.38	10.10	18.96	767.28	X
ATL-04	NA	780.27	18.95	27.56	761.32	
ATL-05	NA	773.42	8.93	18.15	764.49	X
MW2-02	NA	783.40	17.02	20.65	766.38	X
MW-3	NA	NA	Not Located			
MW3-01	NA	777.44	13.23	29.06	764.21	
MW3-02	NA	777.81	13.66	16.10	764.15	X
MW3-04	NA	776.07	11.82	14.43	764.25	X

See Notes on Page 3.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table 2-3 -- Allied OU and Neighboring Properties - June 25-26, 2009 Groundwater and Surface Water Elevation Data

Well/ Piezometer	Hydrostratigraphic Unit Screened Within Surficial Aquifer Unit (Units as Defined in RI)	Top of Casing Elevation (feet AMSL)	6/25-6/26/09			Locations Used for Water Table Contour Map
			Depth to Water (ft below TOC)	Measured Depth to Bottom (ft below TOC)	Groundwater Elevation (feet AMSL)	
Performance Paper Property (Cont.)						
MW-4	NA	NA	Not Located			
MW-5	NA	NA	Not Located			
MW-6	NA	780.27	14.09	28.02	766.18	X
MW-7	NA	783.72	21.72	28.19	762.00	X
MW-9	NA	787.64	16.59	23.46	771.05	
MW-10D	NA	781.52	11.65	41.70	769.87	
MW-10S	NA	780.73	13.38	18.40	767.35	X
MW-11	NA	778.96	7.45	16.23	771.51	X
MW-12D	NA	771.65	4.45	36.55	767.20	
MW-12S	NA	771.41	5.18	14.20	766.23	X
MW-13	NA	788.40	21.67	27.68	766.73	
MW-14	NA	767.76	6.17	11.67	761.59	X
MW-15D	NA	779.79	16.98	43.65	762.81	
MW-15S	NA	779.72	17.45	22.75	762.27	X
MW-16D	NA	777.36	15.50	39.57	761.86	
MW-16S	NA	776.94	15.10	19.98	761.84	X
MWB-02	NA	783.25	21.09	25.02	762.16	
MWB-03	NA	NA	Not Located			
MWLTI	NA	NA	Not Located			
PW-1	NA	789.47	21.02	41.03	768.45	
PW-2	NA	786.18	Damaged			
PW-3	NA	778.22	Damaged			
PW-4	NA	775.63	9.52	27.50	766.11	
PW-5	NA	775.04	9.53	23.34	765.51	
PW-6	NA	774.24	Damaged			
Surface Water Elevations						
SG-1	NA	NA	NA	NA	781.92	X
SG-2	NA	NA	NA	NA	791.30	X
SG-3 (Alcott Street Dam)	NA	NA	NA	NA	777.58	X
SG-4	NA	NA	NA	NA	769.22	X
SG-5	NA	NA	NA	NA	765.76	X
SG-6	NA	NA	NA	NA	763.41	X
Standing Water Gage on Allied OU	NA	NA	NA	NA	799.66	X

Notes:

[1] The hydrostratigraphic unit screened is identified as lower sand or intermediate/lower sand; however, note that these unit descriptions refer to the lower portion of the *surficial* aquifer.

[2] Intervening clay layers are absent beneath the peat in this area of the Allied OU; therefore, the upper, intermediate and lower sand units can be thought of as one hydrostratigraphic unit within the surficial unit.

[3] Well screens a sand seam within the upper aquitard.

[4] Groundwater level for MW-209 was at the top of casing.

RI = Remedial Investigation.

bgs = below ground surface.

AMSL = above mean sea level.

Elevations are based on the existing Allied OU site control, which is referenced to the National Geodetic Vertical Datum (NGVD) of 1929.

TOC = Top of casing.

NA = not available.

*Artesian well; measurement is in feet above ground surface and measurement was calculated based on a pressure reading.

Measurements collected on June 26, 2009 were collected while the groundwater exaction system was operating at the Strebor Property; measurements made on July 2, 2009 were collected during a system shutdown.

TOC elevations for non-Allied OU wells and surface water measuring points surveyed by Prein & Newhof in 2009.

Groundwater elevation measurements from the Strebor Property were made by Bay West personnel, while observed by ARCADIS personnel.

Aquifer Unit designations are based on aquifer descriptions in the Remedial Investigation Report (MDEQ, 2008a).

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table 2-4 -- Groundwater Elevation Data at Strebor and Nearby Wells Under Non-Pumping Conditions July 2, 2009

Well Number	Aquifer Unit	7/2/2009	
		Depth to Water (ft below TOC)	Groundwater Elevation (feet AMSL)
Panelyte Property			
MW1	Surficial	8.14	789.02
MW2	Surficial	8.01	787.97
MW7	Surficial	8.29	787.11
MW9	Surficial	1.51	779.60
Strebor Property[1]			
MW-1	Surficial	10.48	792.31
MW-7	Surficial	7.80	787.48
MW-15	Surficial	8.12	789.11
MW-21	Surficial	8.08	786.55
MW-24	Surficial	9.46	790.51
MW-25	Surficial	7.53	787.51
MW-30	Surficial	13.06	783.26
MW-35	Surficial	7.73	787.15
MW-36	Surficial	9.57	778.98
MW-37	Regional	4.89	783.39
MW-38	Surficial	7.82	773.68
MW-39	Regional	8.09*	789.64
MW-40	Regional	5.76	790.75
Performance Paper Property			
ATL-03	Surficial	10.38	767.00
ATL-05	Surficial	9.25	764.17
MW-11	Surficial	7.54	771.42
MW-12S	Surficial	5.43	765.98
Surface Water Elevations			
Alcott Street Dam (SG-3)	Portage Creek	11.77	777.61
SG-4	Portage Creek	19.81	769.12

Notes:
bgs = below ground surface.
AMSL = above mean sea level.
NM = not measured.
TOC = Top of casing.
*Artesian well; measurement is in feet above ground surface and measurement was calculated based on a pressure reading.
Aquifer Unit designations are based on aquifer descriptions in Figure 2 from the April 30, 2008 MDEQ Memorandum from Brant Fisher to Paul Bucholtz.
[1] Measurements were made by Bay West personnel and observed by ARCADIS personnel.
Elevations are based on the existing Allied OU site control, which is referenced to the National Geodetic Vertical Datum (NGVD) of 1929.
The groundwater extraction system at Strebor was temporary shut down on 7/1/09.
The average pumping rate is approximately 125 gallons per minute.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River/Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table 2-5 - City of Kalamazoo Central Well Field 2006 and 2008 PCB Sampling Data

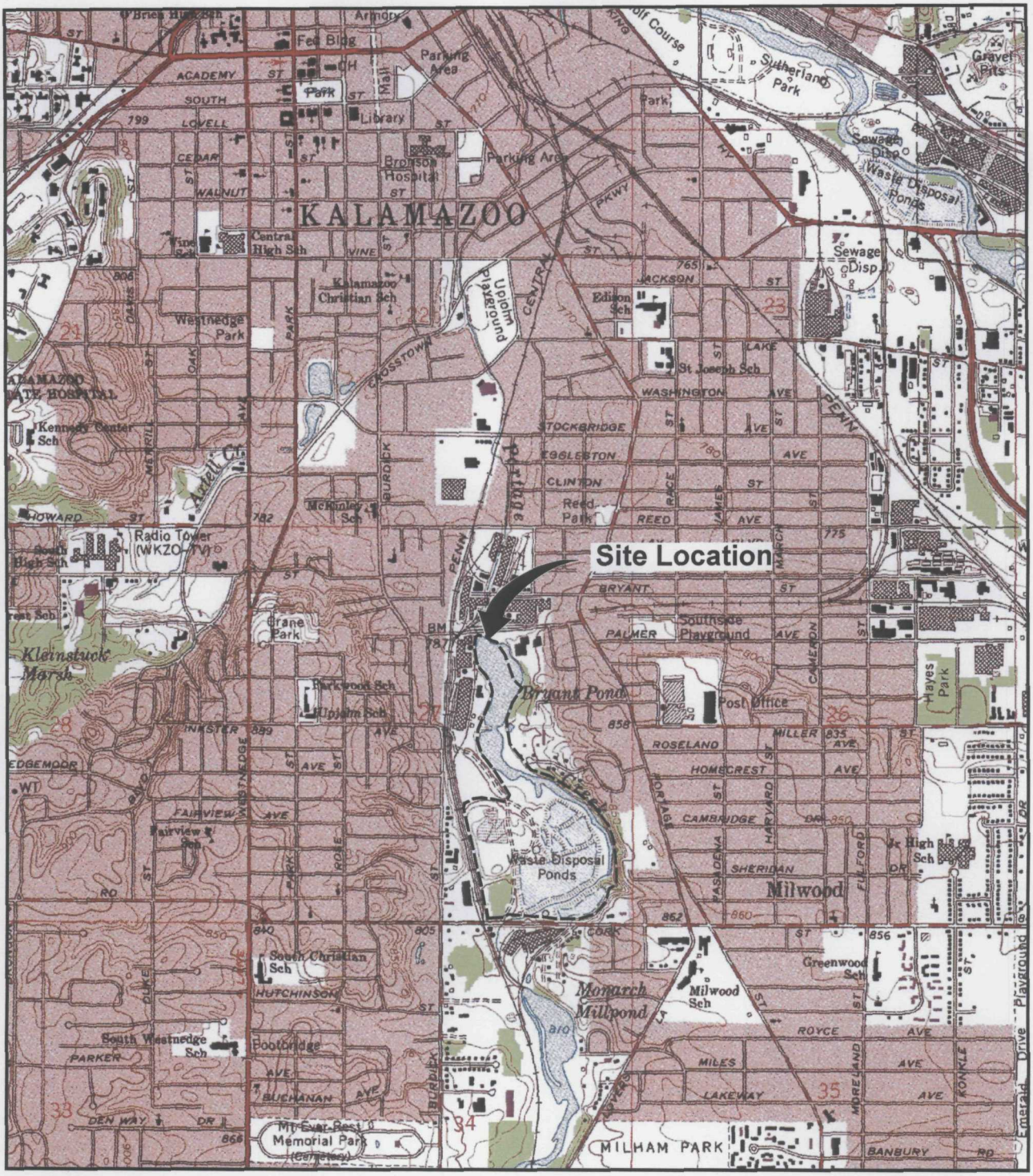
Sample Date	Pumping Station ID	Sample No.	Sample ID	Total PCB (µg/L)[1]
6/28/2006	2	LA 94908	E002 STATION 2	ND (0.05 U)
6/24/2006	1	LA 94908	C001 Central	ND (0.05 U)
8/4/2008	NA	083151-01	"08-217-1-3"	ND (0.05 U)
8/4/2008	NA	083151-02	"08-217-1-5"	ND (0.05 U)
8/4/2008	NA	083151-03	"08-217-1-6"	ND (0.05 U)
8/4/2008	NA	083151-04	"08-217-1-1"	ND (0.05 U)
8/4/2008	NA	083151-07	"08-217-1-4"	ND (0.05 U)
8/4/2008	NA	083151-08	"08-217-1-2"	ND (0.05 U)
8/4/2008	NA	083151-09	"08-217-3-4"	ND (0.05 U)
8/4/2008	NA	083151-10	"08-217-3-5"	ND (0.05 U)
8/4/2008	NA	083151-11	"08-217-3-1"	ND (0.05 U)
8/4/2008	NA	083151-12	"08-217-3-3"	ND (0.05 U)
8/27/2008	3	083589-01	"Sta. 3-2-A, Well 2-A Station 3"	ND (0.05 U)

Notes:
[1]Total PCB included Aroclor 1016, 1221, 1232, 1242, 1248, 1254 and 1260.
ND = not detected.
NA = not available.
µg/L = micrograms per liter.
The analytical data for the City Drinking water chemical analytical results were provided by the City to the USEPA, and subsequently provided to MHLLC by USEPA on September 29, 2008.

Note Explaining Data Qualifiers:
U = The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

ARCADIS

Figures



REFERENCE: BASE MAP SOURCE USGS 7.5 MINUTE QUAD. SERIES KALAMAZOO, MICHIGAN, 1967. (PHOTO REVISED 1973).

2000' 0 2000'

Approximate Scale: 1" = 2000'

Quadrangle Location

MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

SITE LOCATION MAP

ARCADIS

FIGURE
1-1

08/25/09 SYRACUSE-141ENV-DJHOWES
BC064587\70001\00003\CDR\64587N01.CDR

SYR-90 JCR MTK JCR
KRSG - Allied OU (B0064587.0001.00003)
Q:\KRSG\WaterWellLocations\AlliedOU\mxd\CrossSectionLocationMap_v3.mxd - 9/29/2009 @ 4:31:01 PM

NOTES:
1. ALL WELL LOCATIONS ARE APPROXIMATE.
2. CITY WELL LOCATIONS PROVIDED BY THE CITY OF KALAMAZOO DEPARTMENT OF PUBLIC SERVICES ENVIRONMENTAL SERVICES DIVISION.
3. ALLIED OU WELL LOCATIONS ARE NOT SHOWN.
4. STREBOR PROPERTY WELL LOCATIONS WERE DIGITIZED FROM A FIGURE CREATED IN 1993 BY BAY WEST, INC.

KALAMAZOO CENTRAL WELL FIELD
PW7-4
PW7-3
PW7-5
PW7-2
PW7-1
B"
PW3-1
PW3-3
PW3-2A
81-11
81-10
90-8
REED AVE
S PARK ST
PERFORMANCE PAPER SITE
BRYANT ST
MW-29
MW-28
MW-36
MW-37
MW-40
MW-30
E ALCOTT ST
SER PLATING SITE
STREBOR SITE
PANELYTE SITE
E MILLER RD
B
FAIRVIEW AVE
SOUTHERN AVE
ALLIED OU
WHITCOMB ST
S BURDICK ST
W CORK ST
E CORK ST
B'
STATION 15
KALAMAZOO MILLWOOD WELL FIELD
PUMP STATION 18, WELL #2
B"
PORTAGE ST

LEGEND:
- CITY MONITORING WELL
- CITY PRODUCTION WELL
- STREBOR PROPERTY WATER TABLE MONITORING WELL
- STREBOR PROPERTY INTERMEDIATE MONITORING WELL
- STREBOR PROPERTY DEEP MONITORING WELL
- ALLIED PAPER, INC. OPERABLE UNIT BOUNDARY (APPROXIMATE)
- PORTAGE CREEK CENTERLINE (APPROXIMATE)
- LINE OF CROSS SECTION

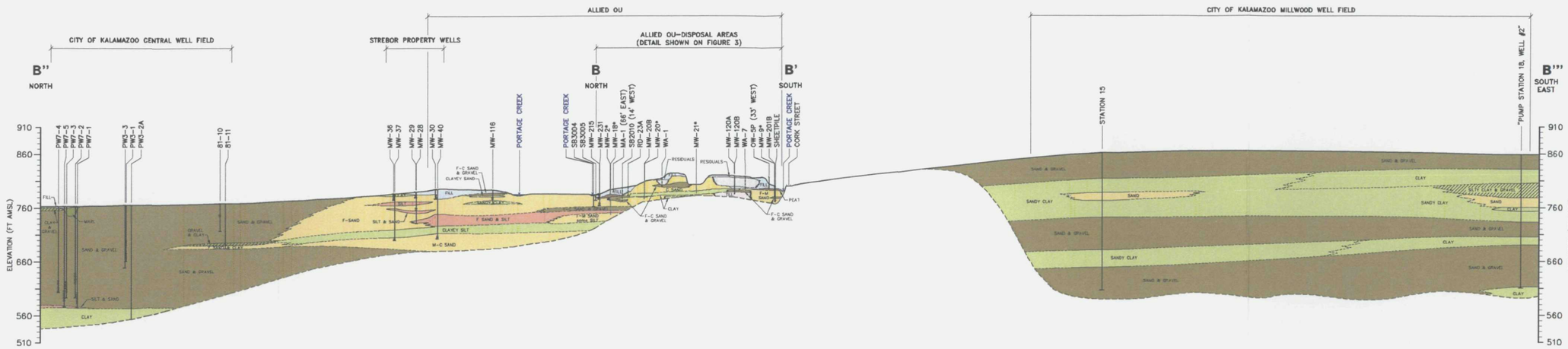
0 1,300 2,600 Feet
GRAPHIC SCALE

MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

CROSS-SECTION LOCATION MAP

ARCADIS

FIGURE
1-2



NOTES:

1. SURFACE ELEVATIONS FROM TOPOGRAPHIC MAPPING BY LOCKWOOD MAPPING, INC., AND MONITORING WELL/BORING SURVEY DATA.
2. AMSL = ABOVE MEAN SEA LEVEL (NGVD OF 1929).

- FILL: CONSISTS CHIEFLY OF A HETEROGENEOUS MIXTURE OF SAND AND SILT WITH VARIABLE AMOUNTS OF GRAVEL AND OCCASIONAL DISCONTINUOUS INTERVALS OF REWORKED PEAT. MAY CONTAIN TRACE AMOUNTS OF RESIDUALS.
- RESIDUALS: RESIDUALS MAY CONTAIN THIN LAYERS OF SAND OR OTHER FILL.
- SAND AND GRAVEL: INTERBEDDED SAND AND GRAVELS, MAY CONTAIN SMALL AMOUNTS OF SILT AND CLAY.
- MARL: UNCONSOLIDATED DEPOSITS OF CLAY AND CALCIUM CARBONATE.
- PEAT: DEPOSITS OF POST-GLACIAL AGE CONSISTING OF PEAT OR ORGANIC-RICH SILT OR CLAY.
- SAND: PREDOMINANT GRAIN SIZE OF SAND SHOWN AS FINE [f], MEDIUM [m], OR COARSE [c]. MAY CONTAIN SMALL AMOUNTS OF CLAY, SILT, OR GRAVEL.
- CLAY: CLAY MAY CONTAIN SMALL AMOUNTS OF f-c SAND AND SILT.
- SILT: SILT MAY CONTAIN SMALL AMOUNTS OF f-c SAND AND CLAY.
- TILL: A GENERALLY HARD DEPOSIT WITH LITTLE OR NO SORTING AND CONSISTING CHIEFLY OF f SAND, SILT, AND/OR CLAY IN VARYING PROPORTIONS, WITH LESSER AMOUNTS OF m-c SAND AND GRAVEL. MAY CONTAIN OCCASIONAL DISCONTINUOUS LENSES OF SILT, SAND, AND/OR GRAVEL.
- GRAVEL AND CLAY

LEGEND:

- NOT CONTINUOUSLY SAMPLED. SAMPLED AT 5 FOOT INTERVALS.
- SB2010 (14' WEST)* — DISTANCE AND DIRECTION FROM WHICH BORING/WELL IS PROJECTED ONTO SECTION LINE (IF GREATER THAN 10 FEET)
- BORING/WELL ID
- SOIL BORING
- MONITORING WELL
- SCREENED INTERVAL
- BOTTOM OF BORING
- INFERRED BOUNDARY
- LIMIT OF AVAILABLE DATA

VERTICAL SCALE 0 100' 200'

HORIZONTAL SCALE 0 600' 1200'

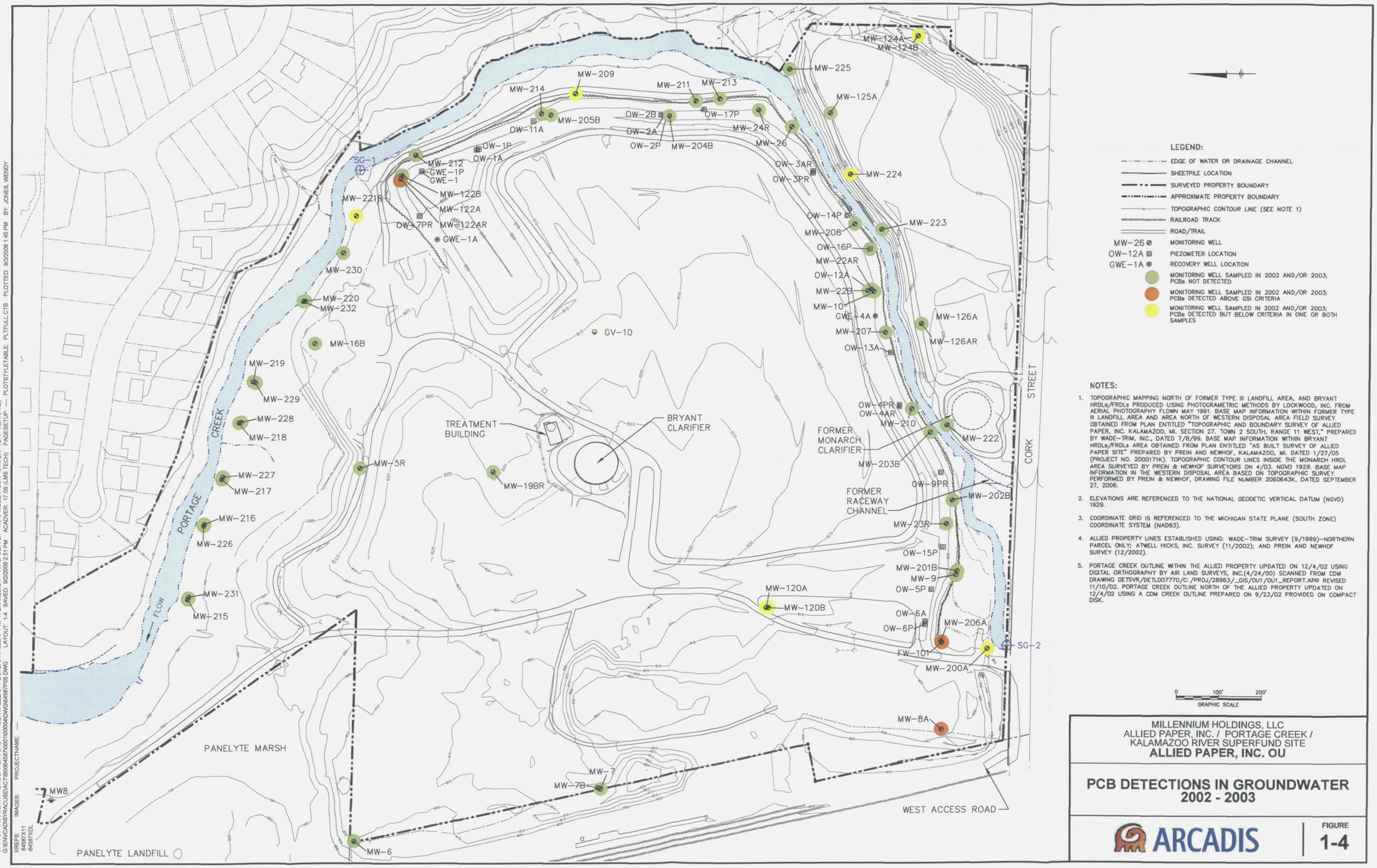
MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

GEOLOGIC CROSS SECTION B''-B-B'-B'''

ARCADIS

FIGURE 1-3

CITY: SYRACUSE, NY GROUP: ENVCAD-141 DB: R ALLEN, P. LISTER, R ALLEN PM: J ROBERTSON LYR:ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACTIVE\00645870010000\04\DWG\64587004.DWG LAYOUT: 1-3 SAVED: 9/3/2009 1:44 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/3/2009 3:04 PM BY: JONES, WENDY
XREFS: IMAGES: PROJECTNAME: ----
64587X11
64587XDL



LEGEND:

- EDGE OF WATER OR DRAINAGE CHANNEL
- SHEETPILE LOCATION
- SURVEYED PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- *TOPOGRAPHIC CONTOUR LINE (SEE NOTE 1)*
- RAILROAD TRACK
- ROAD/TRAIL
- MW-26 MONITORING WELL
- OW-12A PIEZOMETER LOCATION
- GWE-1A RECOVERY WELL LOCATION
- MONITORING WELL SAMPLED IN 2002 AND/OR 2003; PCBs NOT DETECTED
- MONITORING WELL SAMPLED IN 2002 AND/OR 2003; PCBs DETECTED ABOVE GSI CRITERIA
- MONITORING WELL SAMPLED IN 2002 AND/OR 2003; PCBs DETECTED BUT BELOW CRITERIA IN ONE OR BOTH SAMPLES

NOTES:

1. TOPOGRAPHIC MAPPING NORTH OF FORMER TYPE III LANDFILL AREA, AND BRYANT HRDLs/FRDLs PRODUCED USING PHOTOGRAMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN MAY 1991. BASE MAP INFORMATION WITHIN FORMER TYPE III LANDFILL AREA AND AREA NORTH OF WESTERN DISPOSAL AREA FIELD SURVEY OBTAINED FROM PLAN ENTITLED "TOPOGRAPHIC AND BOUNDARY SURVEY OF ALLIED PAPER, INC. KALAMAZOO, MI. SECTION 27. TOWN 2 SOUTH, RANGE 11 WEST," PREPARED BY WADE-TRIM, INC., DATED 7/8/99. BASE MAP INFORMATION WITHIN BRYANT HRDLs/FRDLs AREA OBTAINED FROM PLAN ENTITLED "AS BUILT SURVEY OF ALLIED PAPER SITE" PREPARED BY PREIN AND NEWHOF, KALAMAZOO, MI. DATED 1/27/05 (PROJECT NO. 20D0171K). TOPOGRAPHIC CONTOUR LINES INSIDE THE MONARCH HRDL *AREA SURVEYED BY PREIN & NEWHOF SURVEYORS ON 4/03.* NGVD 1929. BASE MAP INFORMATION IN THE WESTERN DISPOSAL AREA BASED ON TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, DRAWING FILE NUMBER 20D0643K, DATED SEPTEMBER 27, 2006.
2. ELEVATIONS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929.
3. COORDINATE GRID IS REFERENCED TO THE MICHIGAN STATE PLANE (SOUTH ZONE) COORDINATE SYSTEM (NAD83).
4. ALLIED PROPERTY LINES ESTABLISHED USING: WADE-TRIM SURVEY (9/1999)-NORTHERN PARCEL ONLY; ATWELL HICKS, INC. SURVEY (11/2002); AND PREIN AND NEWHOF SURVEY (12/2002).
5. PORTAGE CREEK OUTLINE WITHIN THE ALLIED PROPERTY UPDATED ON 12/4/02 USING DIGITAL ORTHOGRAPHY BY AIR LAND SURVEYS, INC.(4/24/00) SCANNED FROM CDM DRAWING DETSVR/DETL007770/C: /PROJ/28963/_GIS/OU1/OU1_REPORT.APR REVISED 11/10/02. PORTAGE CREEK OUTLINE NORTH OF THE ALLIED PROPERTY UPDATED ON 12/4/02 USING A CDM CREEK OUTLINE PREPARED ON 9/23/02 PROVIDED ON COMPACT DISK.

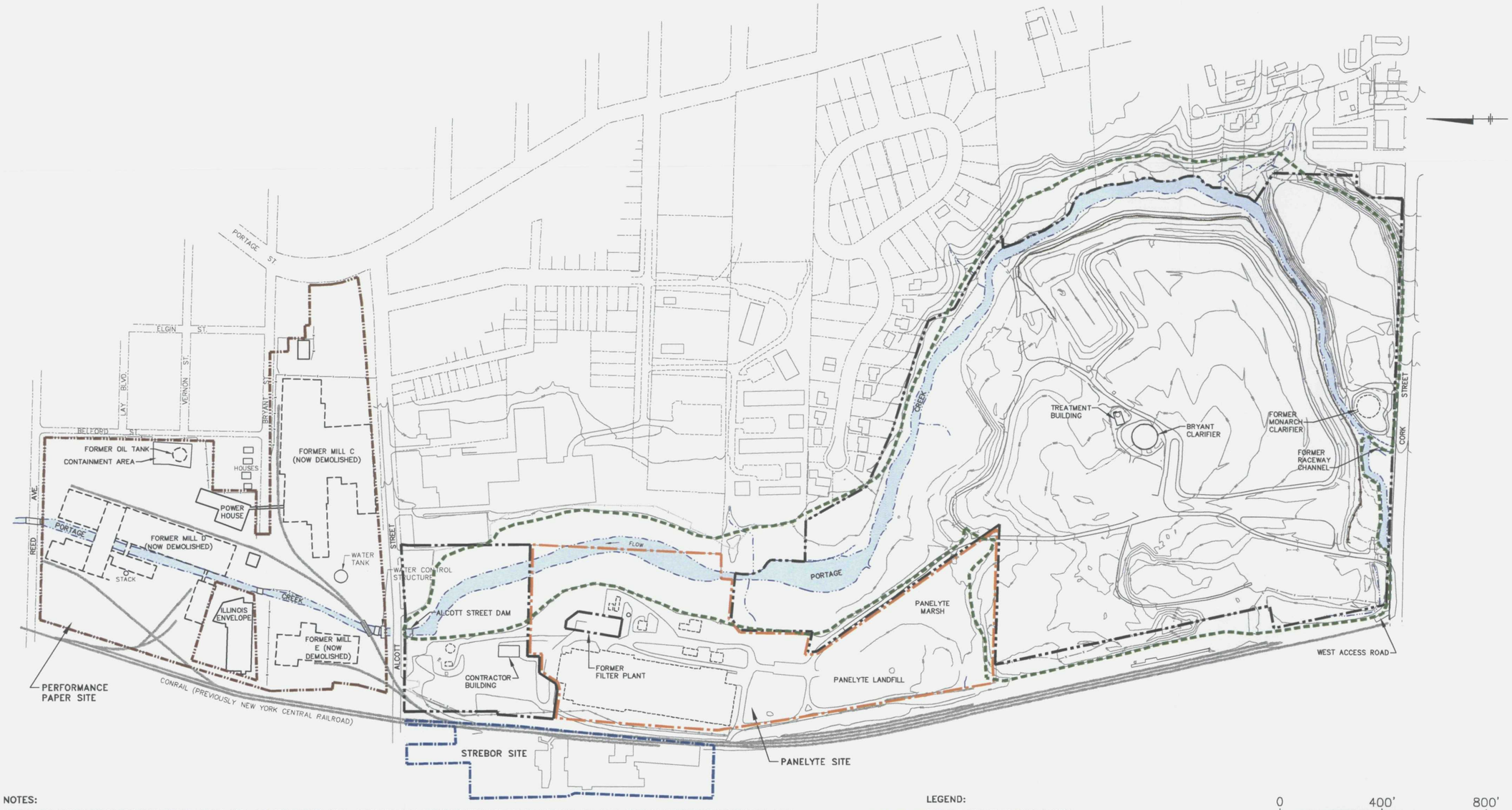
0 100' 200'
GRAPHIC SCALE

MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

PCB DETECTIONS IN GROUNDWATER 2002 - 2003

ARCADIS

FIGURE 1-4



NOTES:

1. TOPOGRAPHIC MAPPING NORTH OF FORMER TYPE III LANDFILL AREA, AND BRYANT HRDLs/FRDLs PRODUCED USING PHOTOGRAMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN MAY 1991. BASE MAP INFORMATION WITHIN FORMER TYPE III LANDFILL AREA AND AREA NORTH OF WESTERN DISPOSAL AREA FIELD SURVEY OBTAINED FROM PLAN ENTITLED "TOPOGRAPHIC AND BOUNDARY SURVEY OF ALLIED PAPER, INC. KALAMAZOO, MI. SECTION 27, TOWN 2 SOUTH, RANGE 11 WEST," PREPARED BY WADE-TRIM, INC., DATED 7/8/99. BASE MAP INFORMATION WITHIN BRYANT HRDLs/FRDLs AREA OBTAINED FROM PLAN ENTITLED "AS BUILT SURVEY OF ALLIED PAPER SITE" PREPARED BY PREIN AND NEWHOF, KALAMAZOO, MI. DATED 1/27/05 (PROJECT NO. 2000171K). TOPOGRAPHIC CONTOUR LINES INSIDE THE MONARCH HRDL AREA SURVEYED BY PREIN & NEWHOF SURVEYORS ON 4/03. NGVD 1929. BASE MAP INFORMATION IN THE WESTERN DISPOSAL AREA BASED ON TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, DRAWING FILE NUMBER 2060643K, DATED SEPTEMBER 27, 2006. BASE MAP INFORMATION AND PERFORMANCE PAPER WELL LOCATIONS BY MACTEC (2002), AND ATLANTIC TESTING (1990) NORTH OF ALCOTT STREET PREPARED BY DIGITIZING A PAPER COPY OF A PDF OF A DRAWING MADE BY "FISHBECK, THOMPSON, CARR & HUBER ENGINEERS-SCIENTISTS-ARCHITECTS" TITLED BASELINE ENVIRONMENTAL ASSESSMENT-SITE PLAN PROJECT NUMBER G03561A, DATED 2005, AT A SCALE OF 1"=150'. PERFORMANCE PAPER WELL LOCATIONS BY "ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC." (ECT), DIGITIZED FROM PAPER COPY OF A PDF OF A DRAWING MADE BY "ECT" TITLED "SITE MAP WITH SAMPLING LOCATIONS – FIGURE 4", DATED 2005, AT A SCALE OF 1"=200'.
2. ELEVATIONS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929.
3. COORDINATE GRID IS REFERENCED TO THE MICHIGAN STATE PLANE (SOUTH ZONE) COORDINATE SYSTEM (NAD83).
4. ALLIED PROPERTY LINES ESTABLISHED USING: WADE-TRIM SURVEY (9/1999)-NORTHERN PARCEL ONLY; ATWELL HICKS, INC. SURVEY (11/2002); AND PREIN AND NEWHOF SURVEY (12/2002).
5. PORTAGE CREEK OUTLINE WITHIN THE ALLIED PROPERTY UPDATED ON 12/4/02 USING DIGITAL ORTHOGRAPHY BY AIR LAND SURVEYS, INC.(4/24/00) SCANNED FROM CDM DRAWING DETSVR/DETL007770/C: /PROJ/28963/_GIS/OU1/OU1_REPORT.APR REVISED 11/10/02. PORTAGE CREEK OUTLINE NORTH OF THE ALLIED PROPERTY UPDATED ON 12/4/02 USING A CDM CREEK OUTLINE PREPARED ON 9/23/02 PROVIDED ON COMPACT DISK.
6. PERFORMANCE PAPER, STREBOR AND PANELYTE SITE MONITORING WELLS SURVEY BY PREIN AND NEWHOF (6/2009).
7. PANELYTE SITE LIMITS WERE DIGITIZED FROM A HARD COPY OF FIGURE 2-1 FROM THE MALCOLM PIRNIE "PRELIMINARY SITE ASSESSMENT REPORT", DATED 12/8/04, AT A SCALE OF 1"=200', AND ARE APPROXIMATE.
8. STREBOR PROPERTY BOUNDARY AND BUILDING DIGITIZED FROM A HARD COPY DOWNLOADED FROM THE CITY OF KALAMAZOO – ONLINE GIS SITE AND ARE APPROXIMATE.

LEGEND:

- EDGE OF WATER OR DRAINAGE CHANNEL
- SHEETPILE LOCATION
- SURVEYED ALLIED OU PROPERTY BOUNDARY
- APPROXIMATE PERFORMANCE PAPER PROPERTY BOUNDARY
- APPROXIMATE PANELYTE SITE LIMITS
- APPROXIMATE STREBOR PROPERTY BOUNDARY
- APPROXIMATE LIMIT OF ALLIED-OU
- TOPOGRAPHIC CONTOUR LINE (SEE NOTE 1)
- RAILROAD TRACK
- ROAD/TRAIL

0 400' 800'

GRAPHIC SCALE

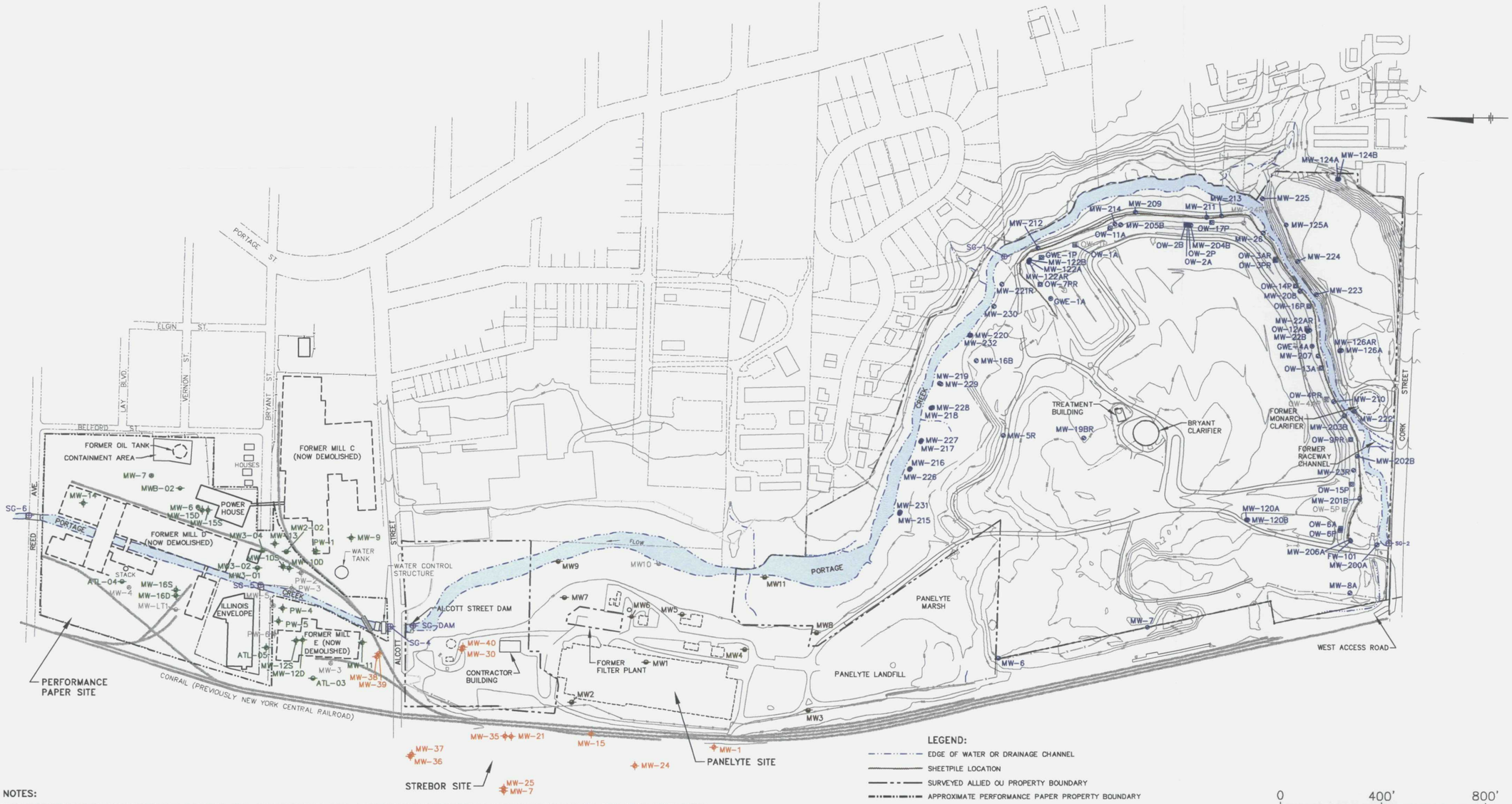
MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

NEIGHBORING PROPERTY LOCATION MAP

ARCADIS

FIGURE 2-1

CITY: SYRACUSE, NY GROUP: ENVCAD DB: R.ALLEN, P. LISTER PM: T GRANZEIER TM: L COFFEY TR: J ROBERTSON LYR:ON=*;OFF=REF; (FRZ)
G:\ENVCAD\SYRACUSE\ACTIB\06458700\01000\04\DWG\64587B12.DWG LAYOUT: 2-1 SAVED: 9/2/2009 1:46 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/2/2009 3:01 PM BY: JONES, WENDY
XREFS: 64587X11
64587XDL
IMAGES:
PROJECTNAME: ---



NOTES:

1. TOPOGRAPHIC MAPPING NORTH OF FORMER TYPE III LANDFILL AREA, AND BRYANT HRDLs/FRDLs PRODUCED USING PHOTOGRAMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN MAY 1991. BASE MAP INFORMATION WITHIN FORMER TYPE III LANDFILL AREA AND AREA NORTH OF WESTERN DISPOSAL AREA FIELD SURVEY OBTAINED FROM PLAN ENTITLED "TOPOGRAPHIC AND BOUNDARY SURVEY OF ALLIED PAPER, INC. KALAMAZOO, MI. SECTION 27. TOWN 2 SOUTH, RANGE 11 WEST," PREPARED BY WADE-TRIM, INC., DATED 7/8/99. BASE MAP INFORMATION WITHIN BRYANT HRDLs/FRDLs AREA OBTAINED FROM PLAN ENTITLED "AS BUILT SURVEY OF ALLIED PAPER SITE" PREPARED BY PREIN AND NEWHOF, KALAMAZOO, MI. DATED 1/27/05 (PROJECT NO. 2000171K). TOPOGRAPHIC CONTOUR LINES INSIDE THE MONARCH HRDL AREA SURVEYED BY PREIN & NEWHOF SURVEYORS ON 4/03. NGVD 1929. BASE MAP INFORMATION IN THE WESTERN DISPOSAL AREA BASED ON TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, DRAWING FILE NUMBER 2060643K, DATED SEPTEMBER 27, 2006. BASE MAP INFORMATION AND PERFORMANCE PAPER WELL LOCATIONS BY MACTEC (2002), AND ATLANTIC TESTING (1990) NORTH OF ALCOTT STREET PREPARED BY DIGITIZING A PAPER COPY OF A PDF OF A DRAWING MADE BY "FISHBECK, THOMPSON, CARR & HUBER ENGINEERS-SCIENTISTS-ARCHITECTS" TITLED BASELINE ENVIRONMENTAL ASSESSMENT-SITE PLAN PROJECT NUMBER G03561A, DATED 2005, AT A SCALE OF 1"=150'. PERFORMANCE PAPER WELL LOCATIONS BY "ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC." (ECT), DIGITIZED FROM PAPER COPY OF A PDF OF A DRAWING MADE BY "ECT" TITLED "SITE MAP WITH SAMPLING LOCATIONS - FIGURE 4", DATED 2005, AT A SCALE OF 1"=200'.
2. ELEVATIONS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929.
3. COORDINATE GRID IS REFERENCED TO THE MICHIGAN STATE PLANE (SOUTH ZONE) COORDINATE SYSTEM (NAD83).
4. ALLIED PROPERTY LINES ESTABLISHED USING: WADE-TRIM SURVEY (9/1999)-NORTHERN PARCEL ONLY; ATWELL HICKS, INC. SURVEY (11/2002); AND PREIN AND NEWHOF SURVEY (12/2002).
5. PORTAGE CREEK OUTLINE WITHIN THE ALLIED PROPERTY UPDATED ON 12/4/02 USING DIGITAL ORTHOGRAPHY BY AIR LAND SURVEYS, INC.(4/24/00) SCANNED FROM CDM DRAWING DETSVR/DETL007770/C: /PROJ/28963/_GIS/OU1/OU1_REPORT.APR REVISED 11/10/02. PORTAGE CREEK OUTLINE NORTH OF THE ALLIED PROPERTY UPDATED ON 12/4/02 USING A CDM CREEK OUTLINE PREPARED ON 9/23/02 PROVIDED ON COMPACT DISK.
6. PERFORMANCE PAPER, STREBOR AND PANELYTE SITE MONITORING WELLS SURVEY BY PREIN AND NEWHOF (6/2009).

LEGEND:

- EDGE OF WATER OR DRAINAGE CHANNEL
- SHEETPILE LOCATION
- SURVEYED ALLIED OU PROPERTY BOUNDARY
- APPROXIMATE PERFORMANCE PAPER PROPERTY BOUNDARY
- TOPOGRAPHIC CONTOUR LINE (SEE NOTE 1)
- RAILROAD TRACK
- ROAD/TRAIL

ALLIED OU
- MW-26 MONITORING WELL
- OW-12A PIEZOMETER LOCATION
- GWE-1A RECOVERY WELL LOCATION

PANELYTE
- MW1 MONITORING WELL INSTALLED BY PANELYTE

STREBOR
- MW-1 STREBOR WELL LOCATION

PERFORMANCE PAPER
- MW-16S MONITORING WELL (ECT-2005)
- MW-4 MONITORING WELL (ATLANTIC TESTING-1990)

- SG-2 EXISTING SURFACE WATER STAFF GAUGE
- MW-4 MONITORING WELL NOT LOCATED OR DAMAGED

0 400' 800'

GRAPHIC SCALE

MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

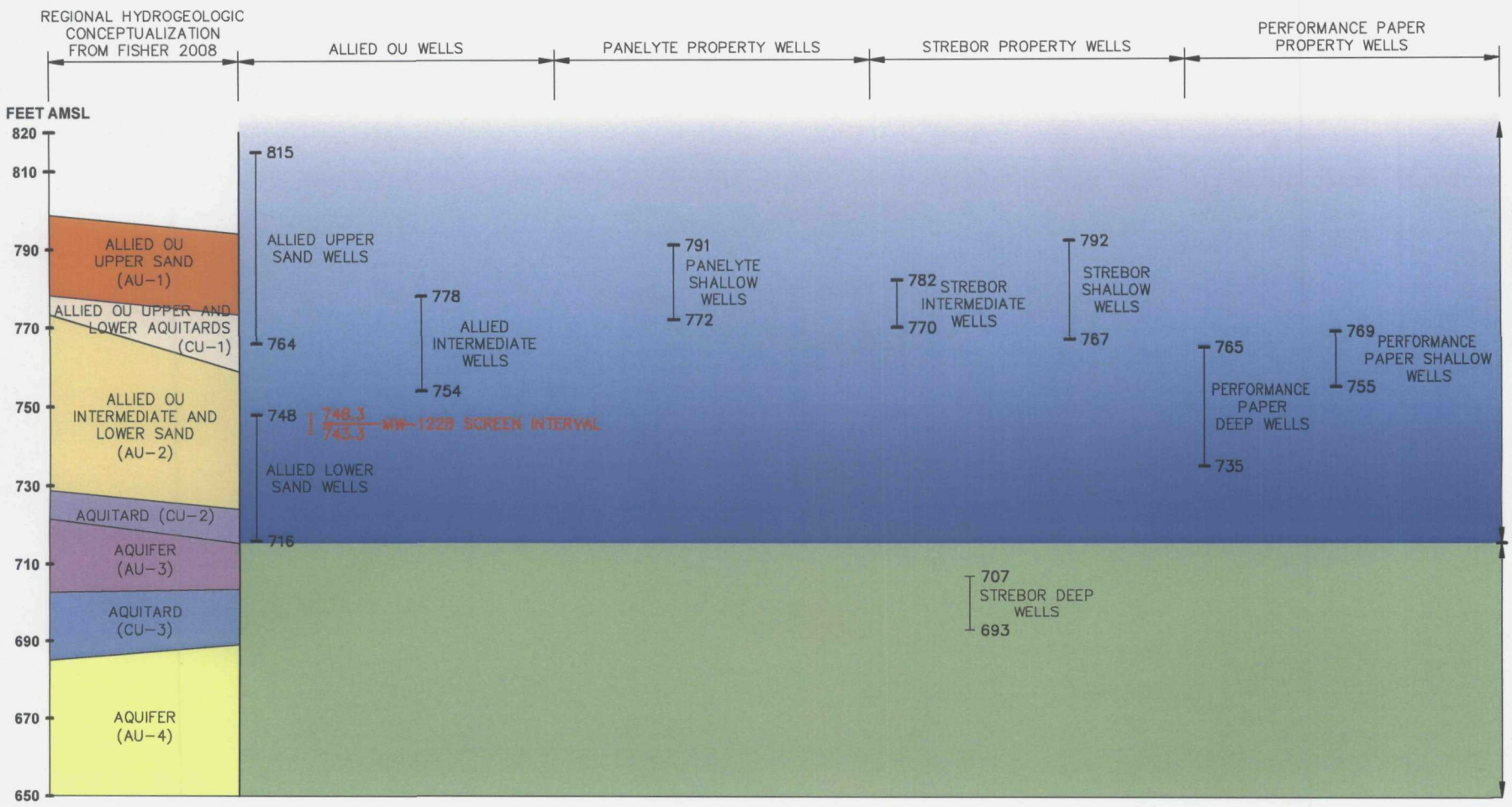
GROUNDWATER INVESTIGATION MONITORING LOCATIONS

ARCADIS

FIGURE 2-2

CITY: SYRACUSE, NY GROUP: ENVCAD-141 DB: R.ALLEN, P. LISTER, R.ALLEN PM: T. GRANZEIER TM: L. COFFEY TR: J. ROBERTSON LYR:ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACTIVE\60645870\0100\0004\DWG\60645878\08.DWG LAYOUT: 2-2 SAVED: 9/3/2009 2:58 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/3/2009 2:59 PM BY: JONES, WENDY
XREFS: 64587X11 64587XDL IMAGES: PROJECTNAME: ---

CITY: SYRACUSE, NY GROUP: ENVCAD-141 DB: G.STOWELL, P. LISTER, R.ALLEN PM: T. GRANZEIER TM: L. COFFEY TR: J. ROBERTSON LYR: ON=*;OFF=REF
G:\ENVCAD\SYRACUSE\ACT\B0064587\0001\00004\DWG\PRESENTATION\64387N02.dwg LAYOUT: 2-3SAVED: 9/3/2009 2:56 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: —PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/3/2009 2:57 PM BY: JONES, WENDY
XREFS: IMAGES: PROJECTNAME: —



NOTES:

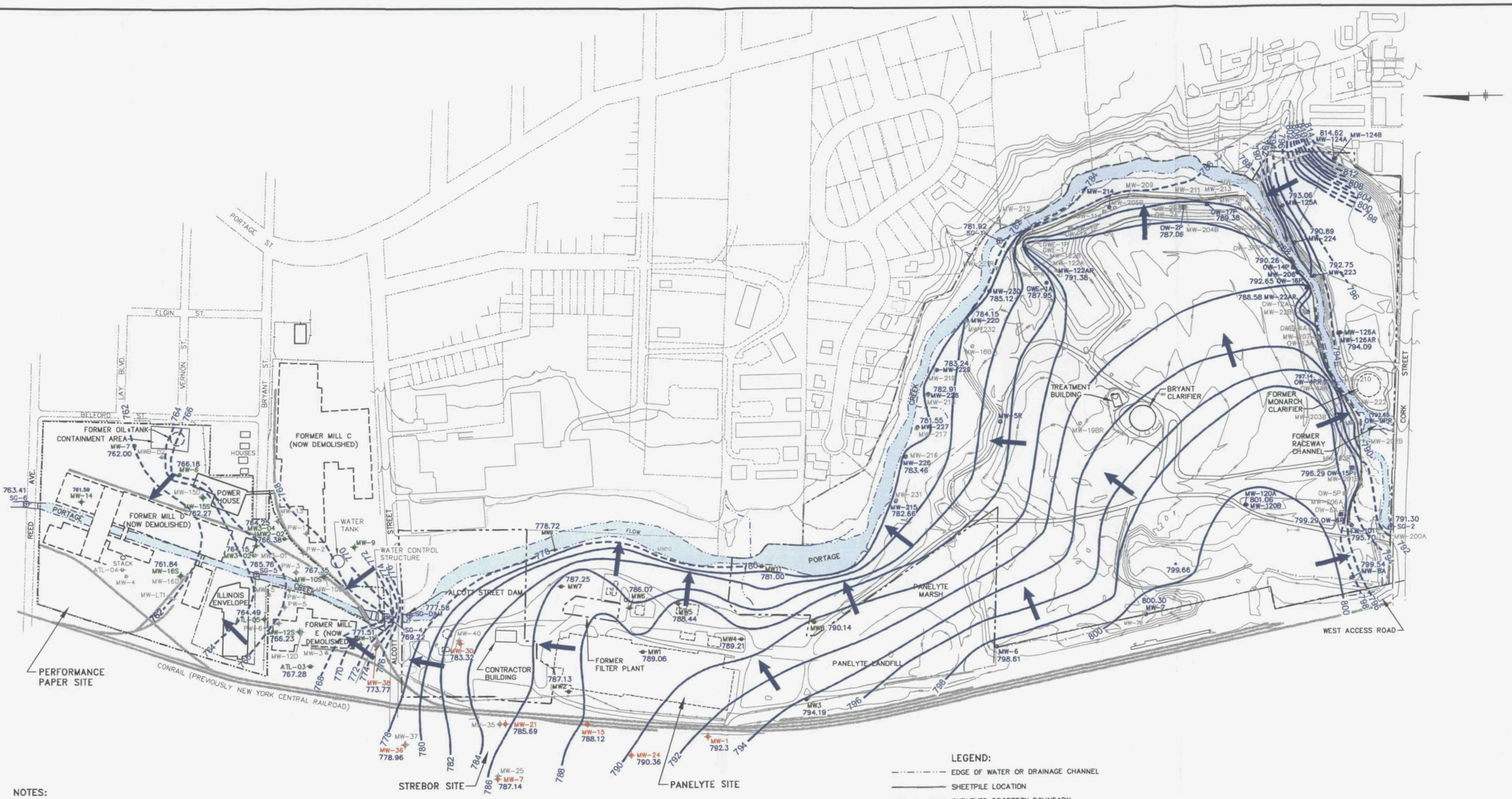
1. REGIONAL HYDROGEOLOGIC CENCEPTUALIZATION ADAPTED FROM FIGURE 2 FROM BRANT FISHER, APRIL 30 2008 MDEQ MEMORANDUM TO PAUL BUCHOLTZ, TITLED HYDROGEOLOGIC CONCEPTUALIZATION.
2. MONITORING WELL ELEVATION RANGES SHOWN ARE ONLY FOR MONITORING WELLS INCLUDED IN JUNE 2009 GROUNDWATER INVESTIGATION.

MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

MONITORING WELL SCREEN INTERVALS RELATIVE TO REGIONAL HYDROGEOLOGIC UNITS

ARCADIS

FIGURE
2-3



NOTES:

1. TOPOGRAPHIC MAPPING NORTH OF FORMER TYPE III LANDFILL AREA, AND BRYANT HRDLs/FRDLs PRODUCED USING PHOTOGRAMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN MAY 1991. BASE MAP INFORMATION WITHIN FORMER TYPE III LANDFILL AREA AND AREA NORTH OF WESTERN DISPOSAL AREA FIELD SURVEY OBTAINED FROM PLAN ENTITLED "TOPOGRAPHIC AND BOUNDARY SURVEY OF ALLIED PAPER, INC. KALAMAZOO, MI. SECTION 27. TOWN 2 SOUTH, RANGE 11 WEST," PREPARED BY WADE-TRIM, INC., DATED 7/8/99. BASE MAP INFORMATION WITHIN BRYANT HRDLs/FRDLs AREA OBTAINED FROM PLAN ENTITLED "AS BUILT SURVEY OF ALLIED PAPER SITE" PREPARED BY PREIN AND NEWHOF, KALAMAZOO, MI. DATED 1/27/05 (PROJECT NO. 2000171K). TOPOGRAPHIC CONTOUR LINES INSIDE THE MONARCH HRDL AREA SURVEYED BY PREIN & NEWHOF SURVEYORS ON 4/03. NGVD 1929. BASE MAP INFORMATION IN THE WESTERN DISPOSAL AREA BASED ON TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, DRAWING FILE NUMBER 2060643K, DATED SEPTEMBER 27, 2006. BASE MAP INFORMATION AND PERFORMANCE PAPER WELL LOCATIONS BY MACTEC (2002), AND ATLANTIC TESTING (1990) NORTH OF ALCOTT STREET PREPARED BY DIGITIZING A PAPER COPY OF A PDF OF A DRAWING MADE BY "FISHBECK, THOMPSON, CARR & HUBER ENGINEERS-SCIENTISTS-ARCHITECTS" TITLED BASELINE ENVIRONMENTAL ASSESSMENT-SITE PLAN PROJECT NUMBER G03561A, DATED 2005, AT A SCALE OF 1"=150'. PERFORMANCE PAPER WELL LOCATIONS BY "ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC." (ECT), DIGITIZED FROM PAPER COPY OF A PDF OF A DRAWING MADE BY "ECT" TITLED "SITE MAP WITH SAMPLING LOCATIONS – FIGURE 4", DATED 2005, AT A SCALE OF 1"=200'.
2. ELEVATIONS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929.
3. COORDINATE GRID IS REFERENCED TO THE MICHIGAN STATE PLANE (SOUTH ZONE) COORDINATE SYSTEM (NAD83).
4. ALLIED PROPERTY LINES ESTABLISHED USING: WADE-TRIM SURVEY (9/1999)-NORTHERN PARCEL ONLY; ATWELL HICKS, INC. SURVEY (11/2002); AND PREIN AND NEWHOF SURVEY (12/2002).
5. PORTAGE CREEK OUTLINE WITHIN THE ALLIED PROPERTY UPDATED ON 12/4/02 USING DIGITAL ORTHOGRAPHY BY AIR LAND SURVEYS, INC.(4/24/00) SCANNED FROM CDM DRAWING DETSVR/DETL007770/C: /PROJ/28963/_GIS/OU1/OU1_REPORT.APR REVISED 11/10/02. PORTAGE CREEK OUTLINE NORTH OF THE ALLIED PROPERTY UPDATED ON 12/4/02 USING A CDM CREEK OUTLINE PREPARED ON 9/23/02 PROVIDED ON COMPACT DISK.
6. PERFORMANCE PAPER, STREBOR AND PANELYTE SITE MONITORING WELLS SURVEY BY PREIN AND NEWHOF (6/2009).
7. MONITORING WELLS SHADED GRAY NOT USED TO GENERATE GROUNDWATER CONTOURS.
8. MONITORING WELLS MW-6, MW-7, MW-8A, MW-125A AND MW-126AR ARE NOT TRUE WATER TABLE WELLS (i.e., THE WATER TABLE IS NOT WITHIN THE SCREENED INTERVAL), RATHER THEY ARE SCREENED SLIGHTLY BELOW THE WATER TABLE. DATA FROM THESE WELLS WERE JUDGED TO REPRESENT A REASONABLE APPROXIMATION OF THE WATER TABLE AND AS SUCH WERE USED TO GUIDE CONTOURING IN AREAS OF SPARSE DATA.

LEGEND:

- EDGE OF WATER OR DRAINAGE CHANNEL
- SHEETPILE LOCATION
- SURVEYED PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- TOPOGRAPHIC CONTOUR LINE (SEE NOTE 1)
- RAILROAD TRACK
- ROAD/TRAIL

ALLIED OU
- MW-26 MONITORING WELL
- DW-12A PIEZOMETER LOCATION
- OWE-1A RECOVERY WELL LOCATION

PANELYTE
- MW1 MONITORING WELL INSTALLED BY PANELYTE

STREBOR
- MW-1 STREBOR WELL LOCATION

PERFORMANCE PAPER
- MW-16S *MONITORING WELL (ECT-2005)*
- MW-4 MONITORING WELL (ATLANTIC TESTING-1990)

- SG-2 EXISTING SURFACE WATER STAFF GAUGE
- STANDING WATER ELEVATION (FEET)
- 795.7 GROUNDWATER ELEVATION (IN FEET)
- 798 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)

0 400' 800'
GRAPHIC SCALE

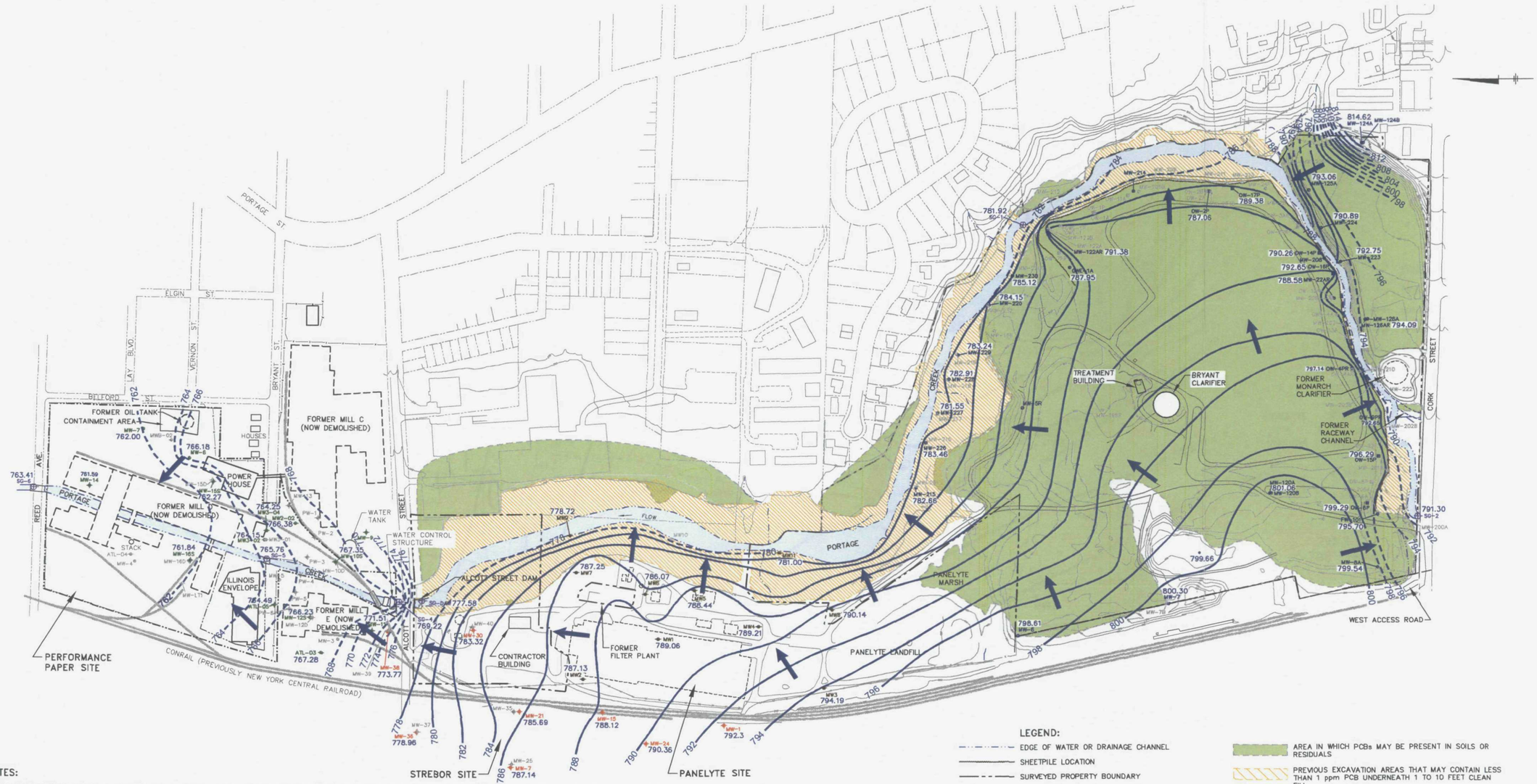
MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

WATER TABLE CONTOUR MAP JUNE 25 - 26, 2009

ARCADIS

FIGURE 3-1

CITY: SYRACUSE, NY GROUP: ENVCAD-141 DB: R ALLEN, P LISTER, R ALLEN, TR: J. ROBERTSON LYR:ON=*;OFF=REF (FRZ)
G:\ENVCAD\SYRACUSE\ACTIVE\00645877\0001000\01DWG\645877W02.DWG LAYOUT: 3-1 SAVED: 9/2/2009 3:07 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/3/2009 1:48 PM BY: JONES, WENDY
XREFS: 645877X11 645877XDL IMAGES: PROJECTNAME: ----



NOTES:

1. TOPOGRAPHIC MAPPING NORTH OF FORMER TYPE III LANDFILL AREA, AND BRYANT HRDLs/FRDLs PRODUCED USING PHOTOGRAMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN MAY 1991. BASE MAP INFORMATION WITHIN FORMER TYPE III LANDFILL AREA AND AREA NORTH OF WESTERN DISPOSAL AREA FIELD SURVEY OBTAINED FROM PLAN ENTITLED "TOPOGRAPHIC AND BOUNDARY SURVEY OF ALLIED PAPER, INC. KALAMAZOO, MI. SECTION 27, TOWN 2 SOUTH, RANGE 11 WEST," PREPARED BY WADE-TRIM, INC., DATED 7/8/99. BASE MAP INFORMATION WITHIN BRYANT HRDLs/FRDLs AREA OBTAINED FROM PLAN ENTITLED "AS BUILT SURVEY OF ALLIED PAPER SITE" PREPARED BY PREIN AND NEWHOF, KALAMAZOO, MI. DATED 1/27/05 (PROJECT NO. 2000171K). TOPOGRAPHIC CONTOUR LINES INSIDE THE MONARCH HRDL AREA SURVEYED BY PREIN & NEWHOF SURVEYORS ON 4/03. NGVD 1929. BASE MAP INFORMATION IN THE WESTERN DISPOSAL AREA BASED ON TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, DRAWING FILE NUMBER 20606434, DATED SEPTEMBER 27, 2006. BASE MAP INFORMATION AND PERFORMANCE PAPER WELL LOCATIONS BY MACTEC (2002), AND ATLANTIC TESTING (1990) NORTH OF ALCOTT STREET PREPARED BY DIGITIZING A PAPER COPY OF A PDF OF A DRAWING MADE BY "FISHBECK, THOMPSON, CARR & HUBER ENGINEERS-SCIENTISTS-ARCHITECTS" TITLED BASELINE ENVIRONMENTAL ASSESSMENT-SITE PLAN PROJECT NUMBER G03561A, DATED 2005, AT A SCALE OF 1"=150'. PERFORMANCE PAPER WELL LOCATIONS BY "ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC." (ECT), DIGITIZED FROM PAPER COPY OF A PDF OF A DRAWING MADE BY "ECT" TITLED "SITE MAP WITH SAMPLING LOCATIONS - FIGURE 4", DATED 2005, AT A SCALE OF 1"=200'.
2. ELEVATIONS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929.
3. COORDINATE GRID IS REFERENCED TO THE MICHIGAN STATE PLANE (SOUTH ZONE) COORDINATE SYSTEM (NAD83).
4. ALLIED PROPERTY LINES ESTABLISHED USING: WADE-TRIM SURVEY (9/1999)-NORTHERN PARCEL ONLY; ATWELL HICKS, INC. SURVEY (11/2002); AND PREIN AND NEWHOF SURVEY (12/2002).
5. PORTAGE CREEK OUTLINE WITHIN THE ALLIED PROPERTY UPDATED ON 12/4/02 USING DIGITAL ORTHOGRAPHY BY AIR LAND SURVEYS, INC.(4/24/00) SCANNED FROM CDM DRAWING DETSVR/DETL007770/C: /PROJ/28963/_GIS/OU1/OU1_REPORT.APR REVISED 11/10/02. PORTAGE CREEK OUTLINE NORTH OF THE ALLIED PROPERTY UPDATED ON 12/4/02 USING A CDM CREEK OUTLINE PREPARED ON 9/23/02 PROVIDED ON COMPACT DISK.
6. PERFORMANCE PAPER, STREBOR AND PANELYTE SITE MONITORING WELLS SURVEY BY PREIN AND NEWHOF (6/2009).
7. MONITORING WELLS SHADED GRAY NOT USED TO GENERATE GROUNDWATER CONTOURS.
8. MONITORING WELLS MW-6, MW-7, MW-8A, MW-125A AND MW-126AR ARE NOT TRUE WATER TABLE WELLS (i.e., THE WATER TABLE IS NOT WITHIN THE SCREENED INTERVAL), RATHER THEY ARE SCREENED SLIGHTLY BELOW THE WATER TABLE. DATA FROM THESE WELLS WERE JUDGED TO REPRESENT A REASONABLE APPROXIMATION OF THE WATER TABLE AND AS SUCH WERE USED TO GUIDE CONTOURING IN AREAS OF SPARSE DATA.
9. THE LIMITS OF THE USEPA EXCAVATION WERE COPIED FROM FIGURE 4-2 OF THE ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE FINAL REPORT, PREPARED BY WESTON, JANUARY 2000; HOWEVER, THE SURVEYED EXCAVATION BOUNDARY PROVIDED BY THE USEPA HAS BEEN MODIFIED BASED ON FIELD OBSERVATIONS TO MORE ACCURATELY REFLECT SITE CONDITIONS.
10. FIGURE BASED ON FIGURE 35A FROM 2003 RI REMEDIAL INVESTIGATION REPORT (BBL, 2003).

LEGEND:

- EDGE OF WATER OR DRAINAGE CHANNEL
- SHEETPILE LOCATION
- SURVEYED PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- TOPOGRAPHIC CONTOUR LINE (SEE NOTE 1)
- RAILROAD TRACK
- ROAD/TRAIL
- MONITORING WELL
- ALLIED OU: PIEZOMETER LOCATION
- ALLIED OU: RECOVERY WELL LOCATION
- PANELYTE: MONITORING WELL INSTALLED BY PANELYTE
- STREBOR: STREBOR WELL LOCATION
- PERFORMANCE PAPER: MONITORING WELL (ECT-2005)
- PERFORMANCE PAPER: MONITORING WELL (ATLANTIC TESTING-1990)
- EXISTING SURFACE WATER STAFF GAUGE
- STANDING WATER ELEVATION (FEET)
- 795.7 GROUNDWATER ELEVATION (IN FEET) (6/25/09-6/26/09)
- 798 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- AREA IN WHICH PCBs MAY BE PRESENT IN SOILS OR RESIDUALS
- PREVIOUS EXCAVATION AREAS THAT MAY CONTAIN LESS THAN 1 ppm PCB UNDERNEATH 1 TO 10 FEET CLEAN FILL

0 400' 800'

GRAPHIC SCALE

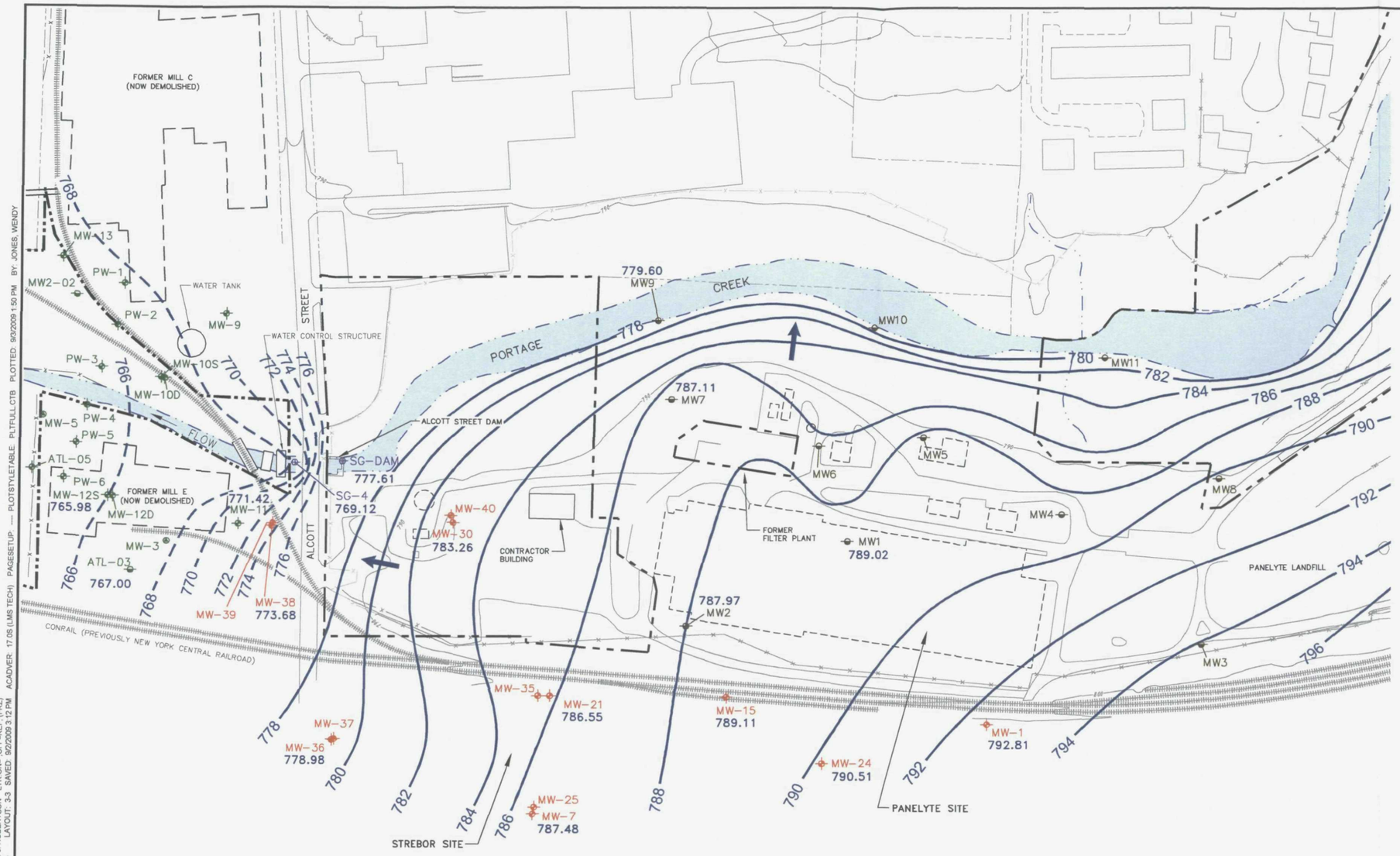
MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

WATER TABLE CONTOUR MAP - JUNE 25 - 26, 2009 AND POTENTIAL EXTENT OF RESIDUALS

ARCADIS

FIGURE 3-2

CITY: SYRACUSE, NY GROUP: ENVCAD DB: R.ALLEN, G.STOWELL, P. LISTER TR: J. ROBERTSON LYR:ON=*;OFF=REF, (FRZ)
G:\ENVCAD\SYRACUSE\ACTIVE\00645870001\000004\DWG\645870W07.DWG LAYOUT: 3-2 SAVED: 9/2/2009 1:49 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/2/2009 3:04 PM BY: JONES, WENDY
XREFS: 645871X11 645871XDL IMAGES: PROJECTNAME: ---



LEGEND:

- EDGE OF WATER OR DRAINAGE CHANNEL
- SURVEYED PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- 810 TOPOGRAPHIC CONTOUR LINE (SEE NOTE 1)
- RAILROAD TRACK
- ROAD/TRAIL
- PANELYTE — MW1 — MONITORING WELL INSTALLED BY PANELYTE
- STREBOR — MW-1 — STREBOR WELL LOCATION
- PERFORMANCE PAPER — MW-16S — MONITORING WELL (ECT-2005)
- PERFORMANCE PAPER — MW-4 — MONITORING WELL (ATLANTIC TESTING-1990)
- SG-4 — EXISTING SURFACE WATER STAFF GAUGE
- 795.7 — GROUNDWATER ELEVATION (IN FEET)
- 798 — GROUNDWATER ELEVATION CONTOUR

NOTES:

1. TOPOGRAPHIC MAPPING NORTH OF FORMER TYPE III LANDFILL AREA, AND BRYANT HRDLs/FRDLs PRODUCED USING PHOTOGRAMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN MAY 1991. BASE MAP INFORMATION WITHIN FORMER TYPE III LANDFILL AREA AND AREA NORTH OF WESTERN DISPOSAL AREA FIELD SURVEY OBTAINED FROM PLAN ENTITLED "TOPOGRAPHIC AND BOUNDARY SURVEY OF ALLIED PAPER, INC. KALAMAZOO, MI. SECTION 27, TOWN 2 SOUTH, RANGE 11 WEST," PREPARED BY WADE-TRIM, INC., DATED 7/8/99. BASE MAP INFORMATION WITHIN BRYANT HRDLs/FRDLs AREA OBTAINED FROM PLAN ENTITLED "AS BUILT SURVEY OF ALLIED PAPER SITE" PREPARED BY PREIN AND NEWHOF, KALAMAZOO, MI. DATED 1/27/05 (PROJECT NO. 2000171K). TOPOGRAPHIC CONTOUR LINES INSIDE THE MONARCH HRDL AREA SURVEYED BY PREIN & NEWHOF SURVEYORS ON 4/03. NGVD 1929. BASE MAP INFORMATION IN THE WESTERN DISPOSAL AREA BASED ON TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, DRAWING FILE NUMBER 2060643K, DATED SEPTEMBER 27, 2006. BASE MAP INFORMATION AND PERFORMANCE PAPER WELL LOCATIONS BY MACTEC (2002), AND ATLANTIC TESTING (1990) NORTH OF ALCOTT STREET PREPARED BY DIGITIZING A PAPER COPY OF A PDF OF A DRAWING MADE BY "FISHBECK, THOMPSON, CARR & HUBER ENGINEERS-SCIENTISTS-ARCHITECTS" TITLED BASELINE ENVIRONMENTAL ASSESSMENT-SITE PLAN PROJECT NUMBER 603561A, DATED 2005, AT A SCALE OF 1"=150'. PERFORMANCE PAPER WELL LOCATIONS BY "ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC." (ECT), DIGITIZED FROM PAPER COPY OF A PDF OF A DRAWING MADE BY "ECT" TITLED "SITE MAP WITH SAMPLING LOCATIONS – FIGURE 4", DATED 2005, AT A SCALE OF 1"=200'.
2. ELEVATIONS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929.
3. COORDINATE GRID IS REFERENCED TO THE MICHIGAN STATE PLANE (SOUTH ZONE) COORDINATE SYSTEM (NAD83).
4. ALLIED PROPERTY LINES ESTABLISHED USING: WADE-TRIM SURVEY (9/1999)-NORTHERN PARCEL ONLY; ATWELL HICKS, INC. SURVEY (11/2002); AND PREIN AND NEWHOF SURVEY (12/2002).
5. PORTAGE CREEK OUTLINE WITHIN THE ALLIED PROPERTY UPDATED ON 12/4/02 USING DIGITAL ORTHOGRAPHY BY AIR LAND SURVEYS, INC.(4/24/00) SCANNED FROM CDM DRAWING DETSVR/DETL007770/C: /PROJ/28963/_GIS/OU1/OU1_REPORT.APR REVISED 11/10/02. PORTAGE CREEK OUTLINE NORTH OF THE ALLIED PROPERTY UPDATED ON 12/4/02 USING A CDM CREEK OUTLINE PREPARED ON 9/23/02 PROVIDED ON COMPACT DISK.
6. PERFORMANCE PAPER, STREBOR AND PANELYTE SITE MONITORING WELLS SURVEY BY PREIN AND NEWHOF (6/2009).
7. GROUNDWATER ELEVATIONS WERE COLLECTED DURING A SHUTDOWN PERIOD OF THE STREBOR GROUNDWATER EXTRACTION SYSTEM.

0 200' 400'

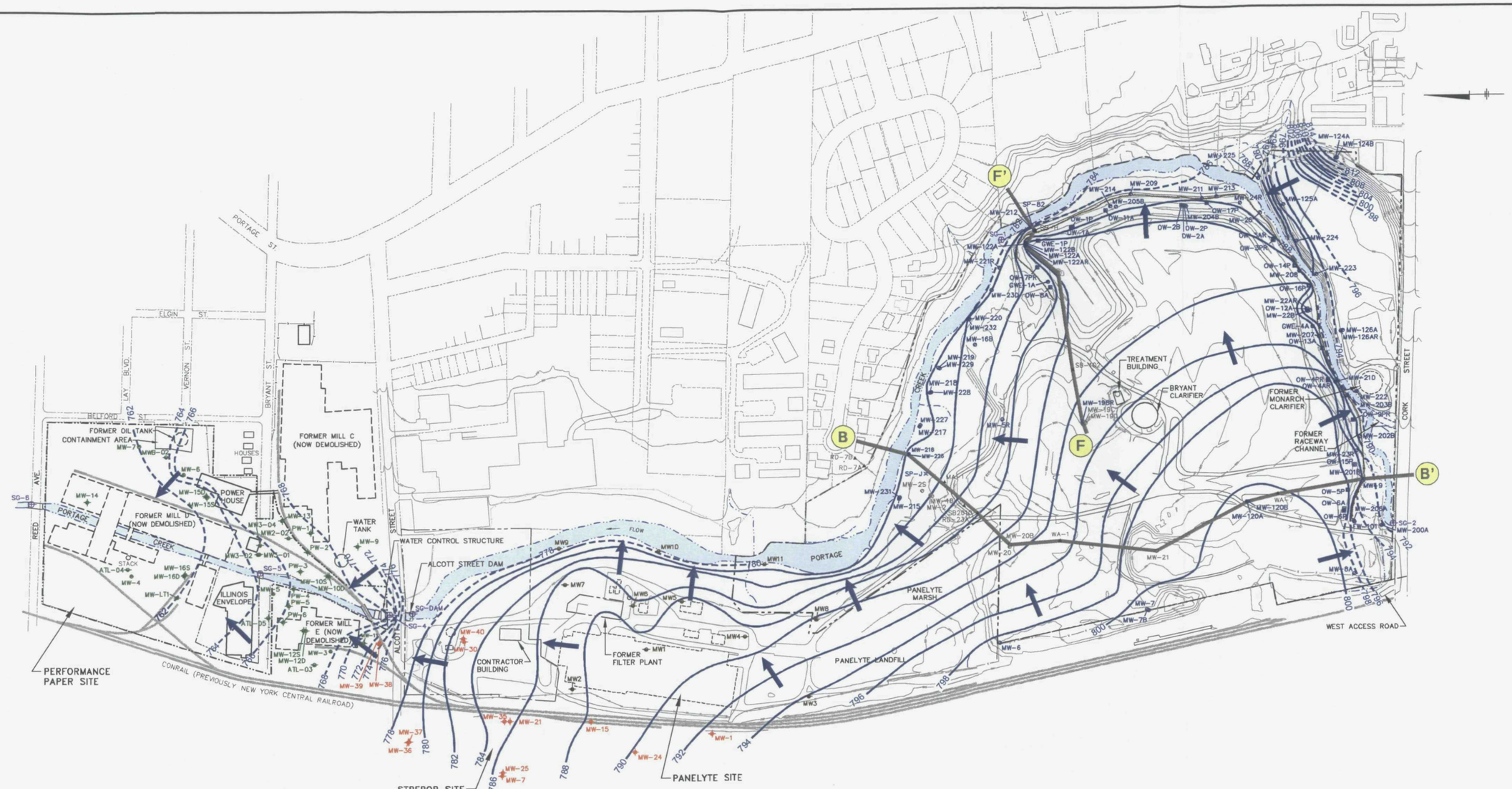
GRAPHIC SCALE

MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK /
KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

WATER TABLE CONTOUR MAP
JULY 2, 2009

ARCADIS

FIGURE
3-3



NOTES:

1. TOPOGRAPHIC MAPPING NORTH OF FORMER TYPE III LANDFILL AREA, AND BRYANT HRDLs/FRDLs PRODUCED USING PHOTOGRAMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN MAY 1991. BASE MAP INFORMATION WITHIN FORMER TYPE III LANDFILL AREA AND AREA NORTH OF WESTERN DISPOSAL AREA FIELD SURVEY OBTAINED FROM PLAN ENTITLED "TOPOGRAPHIC AND BOUNDARY SURVEY OF ALLIED PAPER, INC. KALAMAZOO, MI. SECTION 27. TOWN 2 SOUTH, RANGE 11 WEST," PREPARED BY WADE-TRIM, INC., DATED 7/8/99. BASE MAP INFORMATION WITHIN BRYANT HRDLs/FRDLs AREA OBTAINED FROM PLAN ENTITLED "AS BUILT SURVEY OF ALLIED PAPER SITE" PREPARED BY PREIN AND NEWHOF, KALAMAZOO, MI. DATED 1/27/05 (PROJECT NO. 2000171K). TOPOGRAPHIC CONTOUR LINES INSIDE THE MONARCH HRDL AREA SURVEYED BY PREIN & NEWHOF SURVEYORS ON 4/03. NGVD 1929. BASE MAP INFORMATION IN THE WESTERN DISPOSAL AREA BASED ON TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, DRAWING FILE NUMBER 2060643K, DATED SEPTEMBER 27, 2006. BASE MAP INFORMATION AND PERFORMANCE PAPER WELL LOCATIONS BY MACTEC (2002), AND ATLANTIC TESTING (1990) NORTH OF ALCOTT STREET PREPARED BY DIGITIZING A PAPER COPY OF A PDF OF A DRAWING MADE BY "FISHBECK, THOMPSON, CARR & HUBER ENGINEERS-SCIENTISTS-ARCHITECTS" TITLED BASELINE ENVIRONMENTAL ASSESSMENT-SITE PLAN PROJECT NUMBER G03561A, DATED 2005, AT A SCALE OF 1"=150'. PERFORMANCE PAPER WELL LOCATIONS BY "ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC." (ECT), DIGITIZED FROM PAPER COPY OF A PDF OF A DRAWING MADE BY "ECT" TITLED "SITE MAP WITH SAMPLING LOCATIONS - FIGURE 4", DATED 2005, AT A SCALE OF 1"=200'.
2. ELEVATIONS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929.
3. COORDINATE GRID IS REFERENCED TO THE MICHIGAN STATE PLANE (SOUTH ZONE) COORDINATE SYSTEM (NAD83).
4. ALLIED PROPERTY LINES ESTABLISHED USING: WADE-TRIM SURVEY (9/1999)-NORTHERN PARCEL ONLY; ATWELL HICKS, INC. SURVEY (11/2002); AND PREIN AND NEWHOF SURVEY (12/2002).
5. PORTAGE CREEK OUTLINE WITHIN THE ALLIED PROPERTY UPDATED ON 12/4/02 USING DIGITAL ORTHOGRAPHY BY AIR LAND SURVEYS, INC.(4/24/00) SCANNED FROM CDM DRAWING DETSVR/DETL007770/C:/PROJ/28963/_GIS/OU1/OU1_REPORT.APR REVISED 11/10/02. PORTAGE CREEK OUTLINE NORTH OF THE ALLIED PROPERTY UPDATED ON 12/4/02 USING A CDM CREEK OUTLINE PREPARED ON 9/23/02 PROVIDED ON COMPACT DISK.
6. PERFORMANCE PAPER, STREBOR AND PANELYTE SITE MONITORING WELLS SURVEY BY PREIN AND NEWHOF (6/2009).

LEGEND:

- EDGE OF WATER OR DRAINAGE CHANNEL
- SHEETPILE LOCATION
- SURVEYED PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- TOPOGRAPHIC CONTOUR LINE (SEE NOTE 1)
- RAILROAD TRACK
- ROAD/TRAIL

ALLIED OU
- MW-2S MONITORING WELL
- OW-12A PIEZOMETER LOCATION
- DWE-1A RECOVERY WELL LOCATION

PANELYTE
- MW1 MONITORING WELL INSTALLED BY PANELYTE

STREBOR
- MW-1 STREBOR WELL LOCATION

PERFORMANCE PAPER
- MW-16S MONITORING WELL (ECT-2005)
- MW-4 MONITORING WELL (ATLANTIC TESTING-1990)

- SG-2 EXISTING SURFACE WATER STAFF GAUGE
- 798 WATER TABLE ELEVATION CONTOUR (DASHED WHERE INFERED) JUNE 25 - 26, 2009
- F — F' FLOW NET LOCATION

0 400' 800'
GRAPHIC SCALE

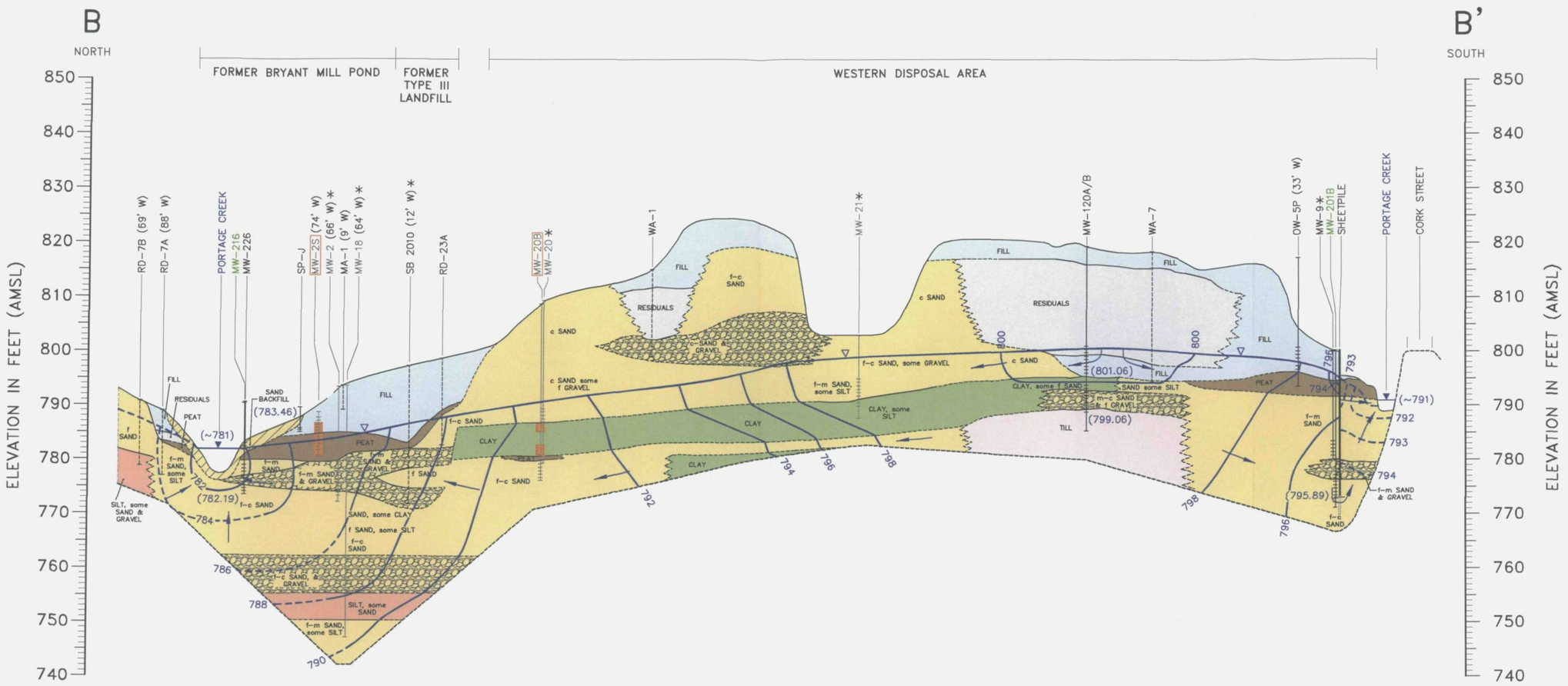
MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

GROUNDWATER FLOW NET CROSS SECTION LOCATION MAP

ARCADIS

FIGURE 3-4

CITY SYRACUSE, NY GROUP: ENVCAD-141 DB: R.ALLEN, P. LISTER R.ALLEN PM: T. GRANZEIER TM: L. COFFEY TR: J. ROBERTSON LYR:ON=*;OFF=REF (FRZ)
G:\ENVCAD\SYRACUSE\ACT\B0064587000110000303DWG\64587V01.DWG LAYOUT: 3-4 SAVED: 9/3/2009 1:52 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/3/2009 1:53 PM BY: JONES, WENDY
XREFS: 64587X11
IMAGES: ----
PROJECTNAME: 64587XDL



LEGEND:

MW-10	SOIL BORING/SINGLE-CASED WELL
MW-205B	DOUBLE-CASED WELL
MW-2S	BORING/WELL LOCATION WITH GEOTECHNICAL SAMPLE(S) COLLECTED AND ANALYZED
GV-09	GAS VENT

MW-1 (11' E) *
- NOT CONTINUOUSLY SAMPLED. SAMPLED AT 5 FOOT INTERVALS.
- DISTANCE AND DIRECTION FROM WHICH BORING/WELL IS PROJECTED ONTO SECTION LINE (IF GREATER THAN 10 FEET)
- BORING/WELL ID

(782.19)
- APPROXIMATE SURFACE WATER ELEVATION
- WATER TABLE 6/25-26/09 (DASHED WHERE INFERRED)
- GAS VENT
- PERMANENT SUMP
- SHEET PILE (SEE NOTE 6)
- SOIL BORING
- ABANDONED MONITORING WELL
- MONITORING WELL
- GEOTECHNICAL SAMPLE INTERVAL
- SCREENED INTERVAL
- GROUNDWATER ELEVATION 6/25 - 26/09
- BOTTOM OF BORING

FILL: CONSISTS CHIEFLY OF A HETEROGENEOUS MIXTURE OF SAND AND SILT WITH VARIABLE AMOUNTS OF GRAVEL AND OCCASIONAL DISCONTINUOUS INTERVALS OF REWORKED PEAT. MAY CONTAIN TRACE AMOUNTS OF RESIDUALS.

SAND BACKFILL: EXTENT (VERTICAL & HORIZONTAL) OF SAND BACKFILL PLACED FOLLOWING THE USEPA'S REMOVAL ACTION AT THE FORMER BRYANT MILL POND IS BASED ON A REVIEW OF THE FINAL REPORT (WESTON, 2000). TOTAL DEPTH OF EXCAVATION WAS NOT PROVIDED WITHIN THE REPORT.

RESIDUALS: RESIDUALS MAY CONTAIN THIN LAYERS OF SAND OR OTHER FILL.

PEAT: DEPOSITS OF POST-GLACIAL AGE CONSISTING OF PEAT OR ORGANIC-RICH SILT OR CLAY.

SAND: PREDOMINANT GRAIN SIZE OF SAND SHOWN AS FINE [f], MEDIUM [m], OR COARSE [c]. MAY CONTAIN SMALL AMOUNTS OF CLAY, SILT, OR GRAVEL.

GRAVEL: GRAVEL MAY CONTAIN SMALL AMOUNTS OF f-c SAND, SILT AND CLAY.

CLAY: CLAY MAY CONTAIN SMALL AMOUNTS OF f-c SAND AND SILT.

SILT: SILT MAY CONTAIN SMALL AMOUNTS OF f-c SAND AND CLAY.

TILL: A GENERALLY HARD DEPOSIT WITH LITTLE OR NO SORTING AND CONSISTING CHIEFLY OF f SAND, SILT, AND/OR CLAY IN VARYING PROPORTIONS, WITH LESSER AMOUNTS OF m-c SAND AND GRAVEL. MAY CONTAIN OCCASIONAL, DISCONTINUOUS LENSES OF SILT, SAND, AND/OR GRAVEL.

NOTES:

1. SURFACE-WATER ELEVATIONS ARE APPROXIMATE AND ARE BASED ON INTERPOLATION BETWEEN GAUGES.
2. DASHED LINES BETWEEN UNITS REPRESENT INFERRED BOUNDARIES.
3. SURFACE ELEVATIONS FROM TOPOGRAPHIC MAPPING BY LOCKWOOD MAPPING, INC., AND MONITORING WELL/BORING SURVEY DATA.
4. AMSL = ABOVE MEAN SEA LEVEL (NGVD OF 1929).
5. THE DASHED PORTION OF THE SHEET PILE ILLUSTRATES THE HIGHEST AND LOWEST DRIVEN DEPTH OF THE PILING WITHIN 20 FT. OF EITHER SIDE OF THE LINE OF SECTION. THE HORIZONTAL LINE DEPICTS THE DRIVEN DEPTH OF THE SHEET PILE ALONG THE LINE OF SECTION.
6. REFRACTION ANGLES OF EQUIPOTENTIAL LINES ARE APPROXIMATE. THE FLOW NET AS ILLUSTRATED IS CONCEPTUAL AND CONSISTENT WITH AVAILABLE DATA.

10' 0 10' 20'
VERTICAL SCALE

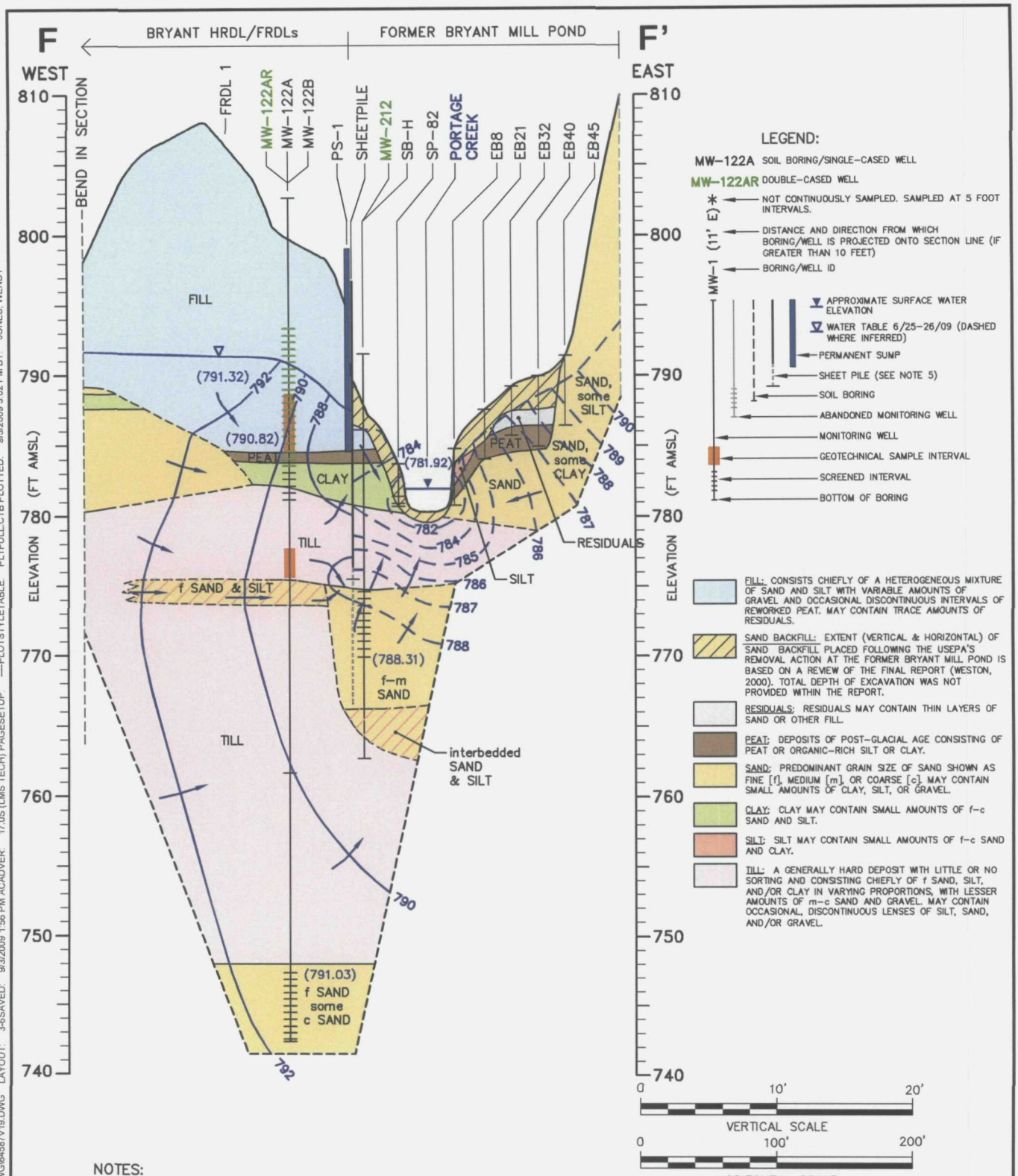
100' 0 100' 200'
HORIZONTAL SCALE

MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

GEOLOGIC CROSS SECTION B-B' GROUNDWATER FLOW NET JUNE 25-26, 2009

ARCADIS

FIGURE 3-5



NOTES:

1. CREEK WATER ELEVATION APPROXIMATE.
2. DASHED LINES BETWEEN UNITS REPRESENT INFERRED BOUNDARIES.
3. SURFACE ELEVATIONS FROM TOPOGRAPHIC MAPPING BY LOCKWOOD MAPPING, INC., AND MONITORING WELL/BORING SURVEY DATA. GROUND SURFACE UPDATED BASED ON SURVEYS BY WADE TRIM, DATED 7/8/99, AND PREIN AND NEWHOF, DATED 1/27/05.
4. AMSL = ABOVE MEAN SEA LEVEL (NGVD OF 1929).
5. THE DASHED PORTION OF THE SHEET PILE ILLUSTRATES THE HIGHEST AND LOWEST DRIVEN DEPTH OF THE PILING WITHIN 20 FT. OF EITHER SIDE OF THE LINE OF SECTION. THE HORIZONTAL LINE DEPICTS THE DRIVEN DEPTH OF THE SHEET PILE ALONG THE LINE OF SECTION.
6. REFRACTION ANGLES OF EQUIPOTENTIAL LINES ARE APPROXIMATE. THE FLOW NET AS ILLUSTRATED IS CONCEPTUAL, AND CONSISTENT WITH THE AVAILABLE DATA.

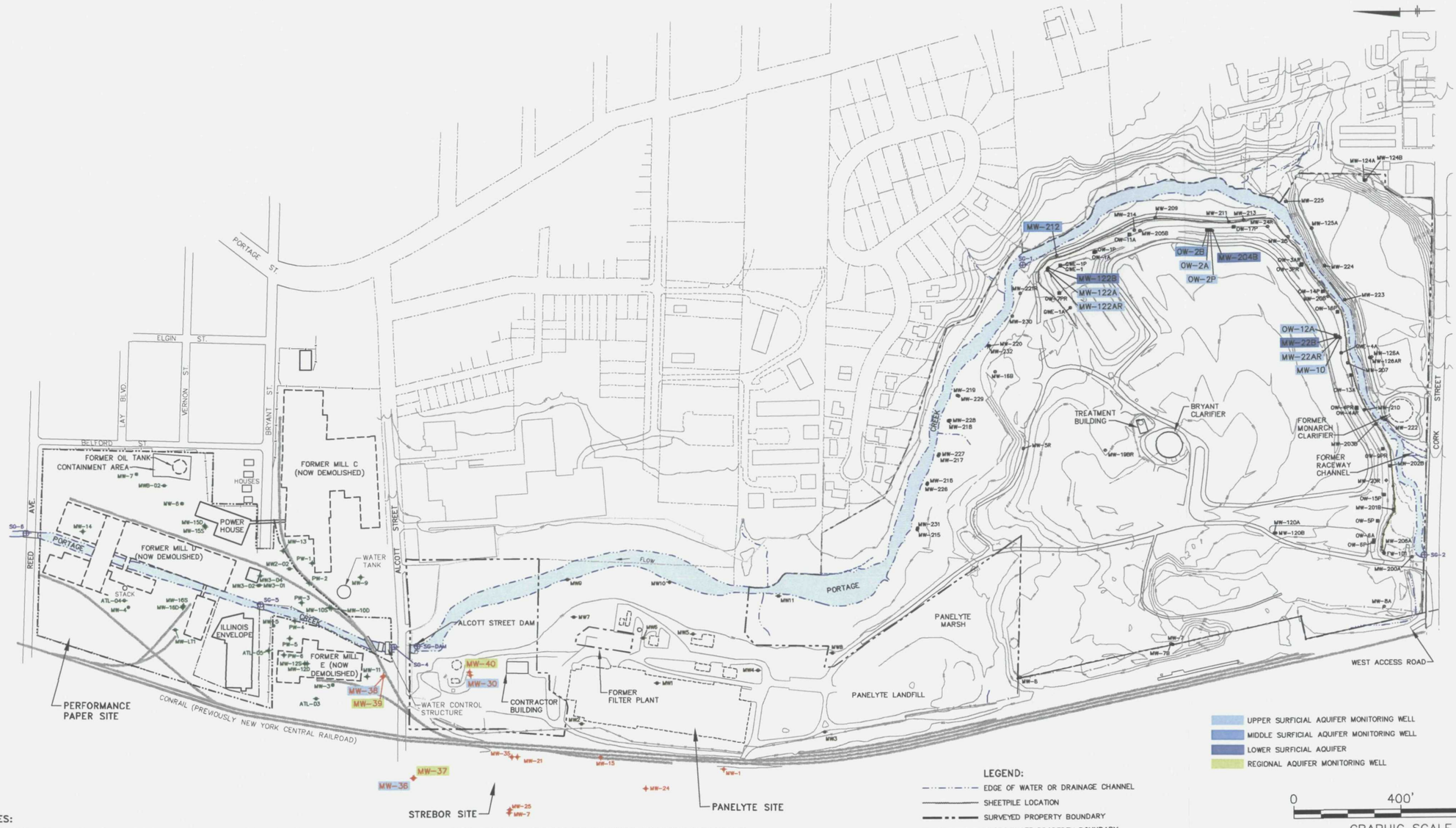
MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK /
KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

GEOLOGIC CROSS SECTION F-F'
GROUNDWATER FLOW NET
JUNE 25 - 26, 2009

ARCADIS

FIGURE
3-6

CITY:SYRACUSE, N.Y. DIV/GROUP:ENVCAD-141 DB:R.ALLEN LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0064587\0001\00003\DWG\64587Y19.DWG LAYOUT: 3-6SAVED: 9/3/2009 1:56 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: —PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/3/2009 3:02 PM BY: JONES, WENDY
XREFS: IMAGES: PROJECTNAME: —
64587XPA



UPPER SURFICIAL AQUIFER MONITORING WELL
MIDDLE SURFICIAL AQUIFER MONITORING WELL
LOWER SURFICIAL AQUIFER
REGIONAL AQUIFER MONITORING WELL

LEGEND:

- EDGE OF WATER OR DRAINAGE CHANNEL
- SHEETPILE LOCATION
- SURVEYED PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- TOPOGRAPHIC CONTOUR LINE (SEE NOTE 1)
- RAILROAD TRACK
- ROAD/TRAIL

ALLIED OU
- MW-2S — SINGLE-CASED MONITORING WELL OR CLUSTER
- MW-203B — DOUBLE-CASED MONITORING WELL
- OW-12A — PIEZOMETER LOCATION
- GWE-1A — RECOVERY WELL LOCATION

PANELYTE
- MW1 — MONITORING WELL INSTALLED BY PANELYTE

STREBOR
- MW-1 — STREBOR WELL LOCATION

PERFORMANCE PAPER
- MW-16S — MONITORING WELL (ECT-2005)
- MW-4 — MONITORING WELL (ATLANTIC TESTING-1990)

SG-2 — EXISTING SURFACE WATER STAFF GAUGE

0 400' 800'
GRAPHIC SCALE

NOTES:

1. TOPOGRAPHIC MAPPING NORTH OF FORMER TYPE III LANDFILL AREA, AND BRYANT HRDLs/FRDLs PRODUCED USING PHOTOGRAMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN MAY 1991. BASE MAP INFORMATION WITHIN FORMER TYPE III LANDFILL AREA AND AREA NORTH OF WESTERN DISPOSAL AREA FIELD SURVEY OBTAINED FROM PLAN ENTITLED "TOPOGRAPHIC AND BOUNDARY SURVEY OF ALLIED PAPER, INC. KALAMAZOO, MI. SECTION 27. TOWN 2 SOUTH, RANGE 11 WEST," PREPARED BY WADE-TRIM, INC., DATED 7/8/99. BASE MAP INFORMATION WITHIN BRYANT HRDLs/FRDLs AREA OBTAINED FROM PLAN ENTITLED "AS BUILT SURVEY OF ALLIED PAPER SITE" PREPARED BY PREIN AND NEWHOF, KALAMAZOO, MI. DATED 1/27/05 (PROJECT NO. 2000171K). TOPOGRAPHIC CONTOUR LINES INSIDE THE MONARCH HRDL AREA SURVEYED BY PREIN & NEWHOF SURVEYORS ON 4/03. NGVD 1929. BASE MAP INFORMATION IN THE WESTERN DISPOSAL AREA BASED ON TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, DRAWING FILE NUMBER 2060643K, DATED SEPTEMBER 27, 2006. BASE MAP INFORMATION AND PERFORMANCE PAPER WELL LOCATIONS BY MACTEC (2002), AND ATLANTIC TESTING (1990) NORTH OF ALCOTT STREET PREPARED BY DIGITIZING A PAPER COPY OF A PDF OF A DRAWING MADE BY "FISHBECK, THOMPSON, CARR & HUBER ENGINEERS-SCIENTISTS-ARCHITECTS" TITLED BASELINE ENVIRONMENTAL ASSESSMENT-SITE PLAN PROJECT NUMBER GO3561A, DATED 2005, AT A SCALE OF 1"=150'. PERFORMANCE PAPER WELL LOCATIONS BY "ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC." (ECT), DIGITIZED FROM PAPER COPY OF A PDF OF A DRAWING MADE BY "ECT" TITLED "SITE MAP WITH SAMPLING LOCATIONS - FIGURE 4", DATED 2005, AT A SCALE OF 1"=200'.
2. ELEVATIONS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929.
3. COORDINATE GRID IS REFERENCED TO THE MICHIGAN STATE PLANE (SOUTH ZONE) COORDINATE SYSTEM (NAD83).
4. ALLIED PROPERTY LINES ESTABLISHED USING: WADE-TRIM SURVEY (9/1999)-NORTHERN PARCEL ONLY; ATWELL HICKS, INC. SURVEY (11/2002); AND PREIN AND NEWHOF SURVEY (12/2002).
5. PORTAGE CREEK OUTLINE WITHIN THE ALLIED PROPERTY UPDATED ON 12/4/02 USING DIGITAL ORTHOGRAPHY BY AIR LAND SURVEYS, INC.(4/24/00) SCANNED FROM CDM DRAWING DETSVR/DETL007770/C:/PROJ/28963/_GIS/OU1/OU1_REPORT.APR REVISED 11/10/02. PORTAGE CREEK OUTLINE NORTH OF THE ALLIED PROPERTY UPDATED ON 12/4/02 USING A CDM CREEK OUTLINE PREPARED ON 9/23/02 PROVIDED ON COMPACT DISK.
6. PERFORMANCE PAPER, STREBOR AND PANELYTE SITE MONITORING WELLS SURVEY BY PREIN AND NEWHOF (6/2009).
7. MW-204B COULD POTENTIALLY BE SCREENED AT THE TOP OF THE REGIONAL AQUIFER, HOWEVER SITE BORING DATA ARE NOT EXTENSIVE ENOUGH AT DEPTH TO CONFIRM THIS.

MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC. / PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

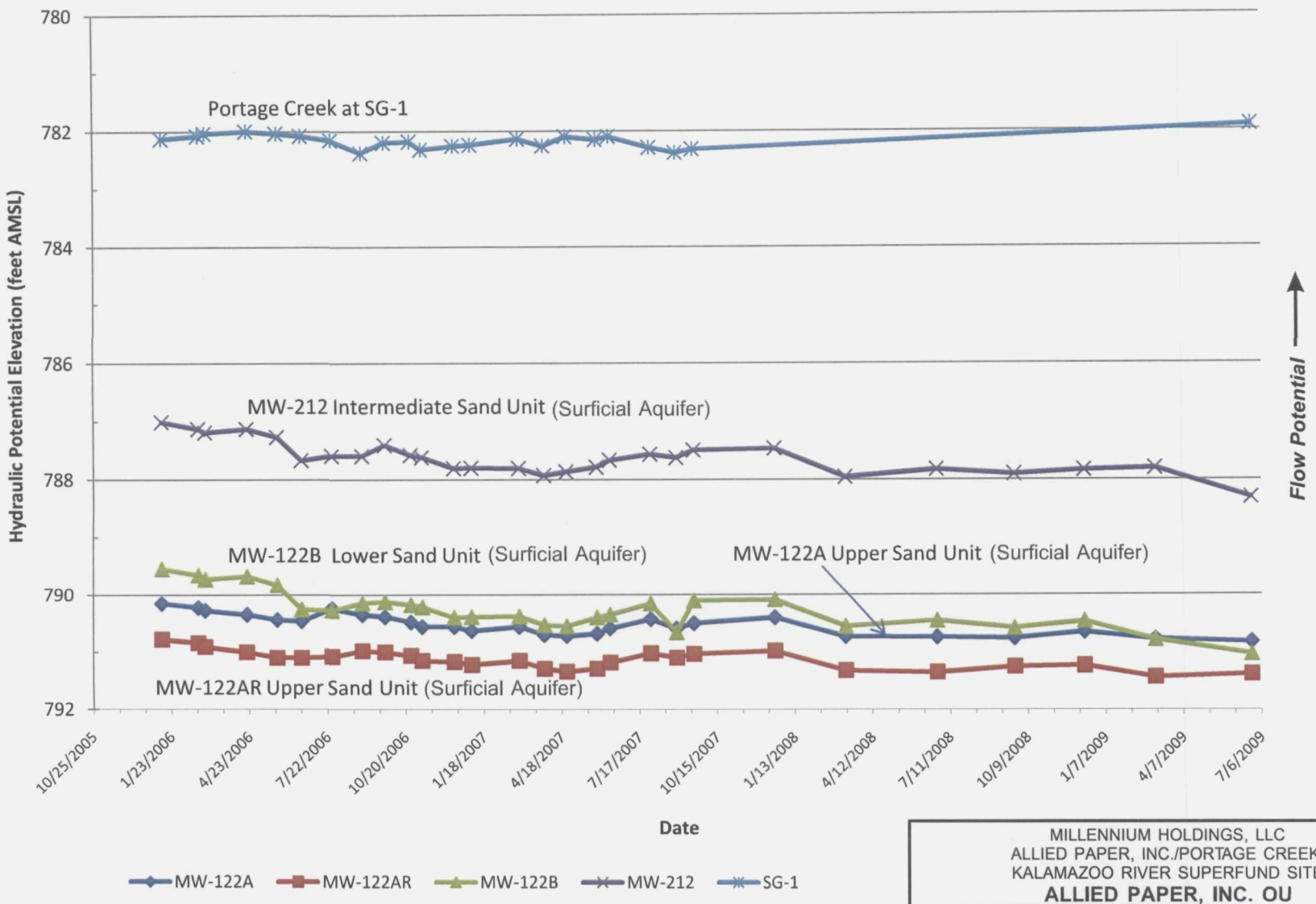
WELL CLUSTER LOCATION MAP

ARCADIS

FIGURE 3-7

CITY: SYRACUSE, NY GROUP: ENVCAD DB: R.ALLEN, L.POSENAUER P: LISTER PM: T.GRANZEIER TM: L.COFFEY TR: J.ROBERTSON LYR:ON=*;OFF=REF (FRZ)
G:\ENVCAD\SYRACUSE\ACT\B0096458700\01000040\DWG\64587W08.DWG LAYOUT: 3-7 SAVED: 9/2/2009 3:58 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/3/2009 1:57 PM BY: JONES, WENDY
XREFs: 64587X11 64587XDL IMAGES: PROJECTNAME: ----

09/30/09 SYRACUSE-141ENV-DJHOWES
B0064587/0001/00003/CDR/64587G05.CDR



The data show a downward flow potential from the upper sand unit to the intermediate sand unit and an upward flow potential from the lower sand unit to the intermediate sand. Portage Creek is at the lowest elevation, and serves as the discharge point for groundwater present in the upper, intermediate, and lower sand units.

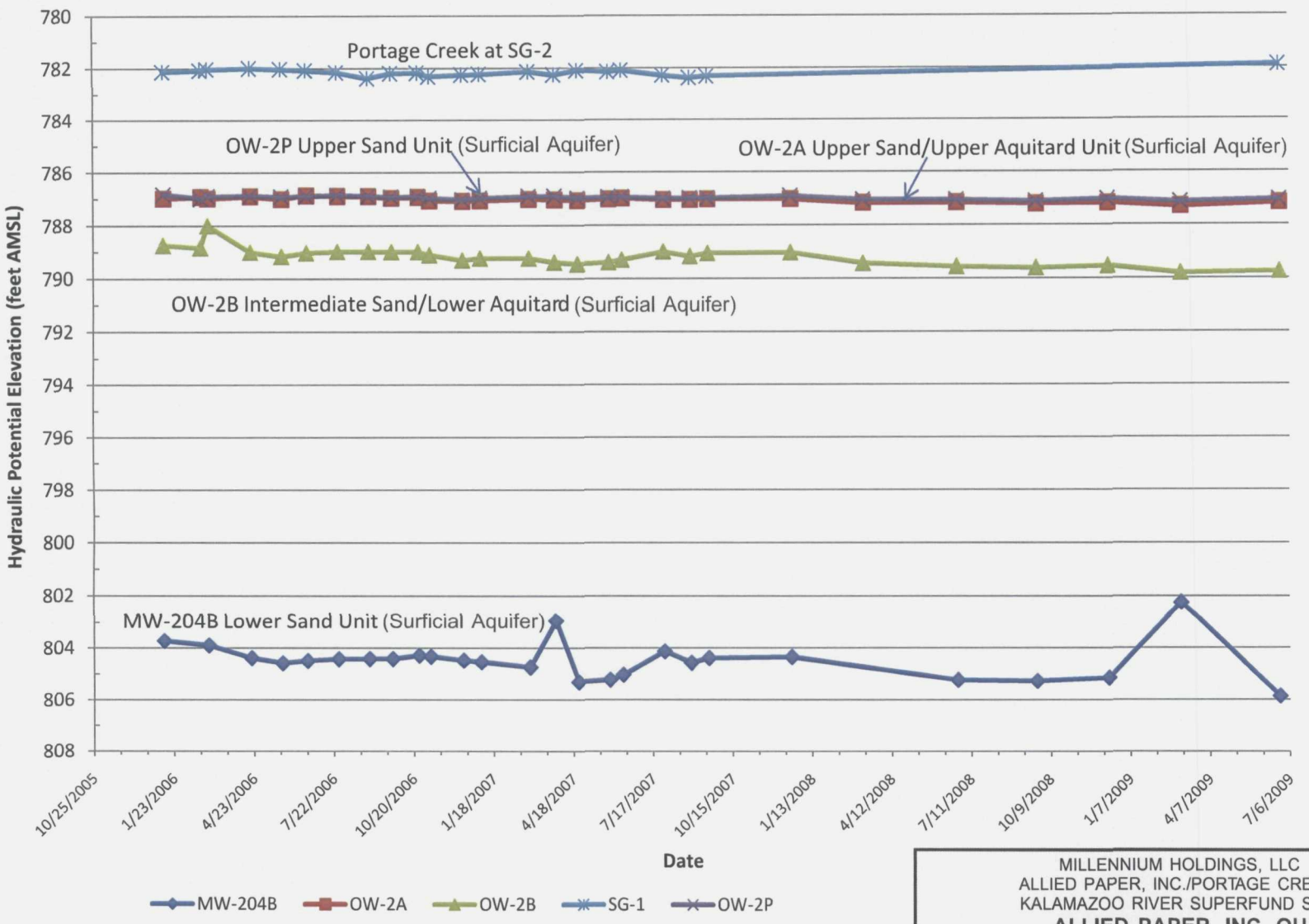
MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

ALLIED OU - MW-122/MW-212 WELL CLUSTER GROUNDWATER ELEVATIONS 2006 - 2009

ARCADIS

FIGURE
3-8

09/30/09 SYRACUSE-141ENV-DJHOWES
B0064587/0001/00003/CDR/64587G06.CDR



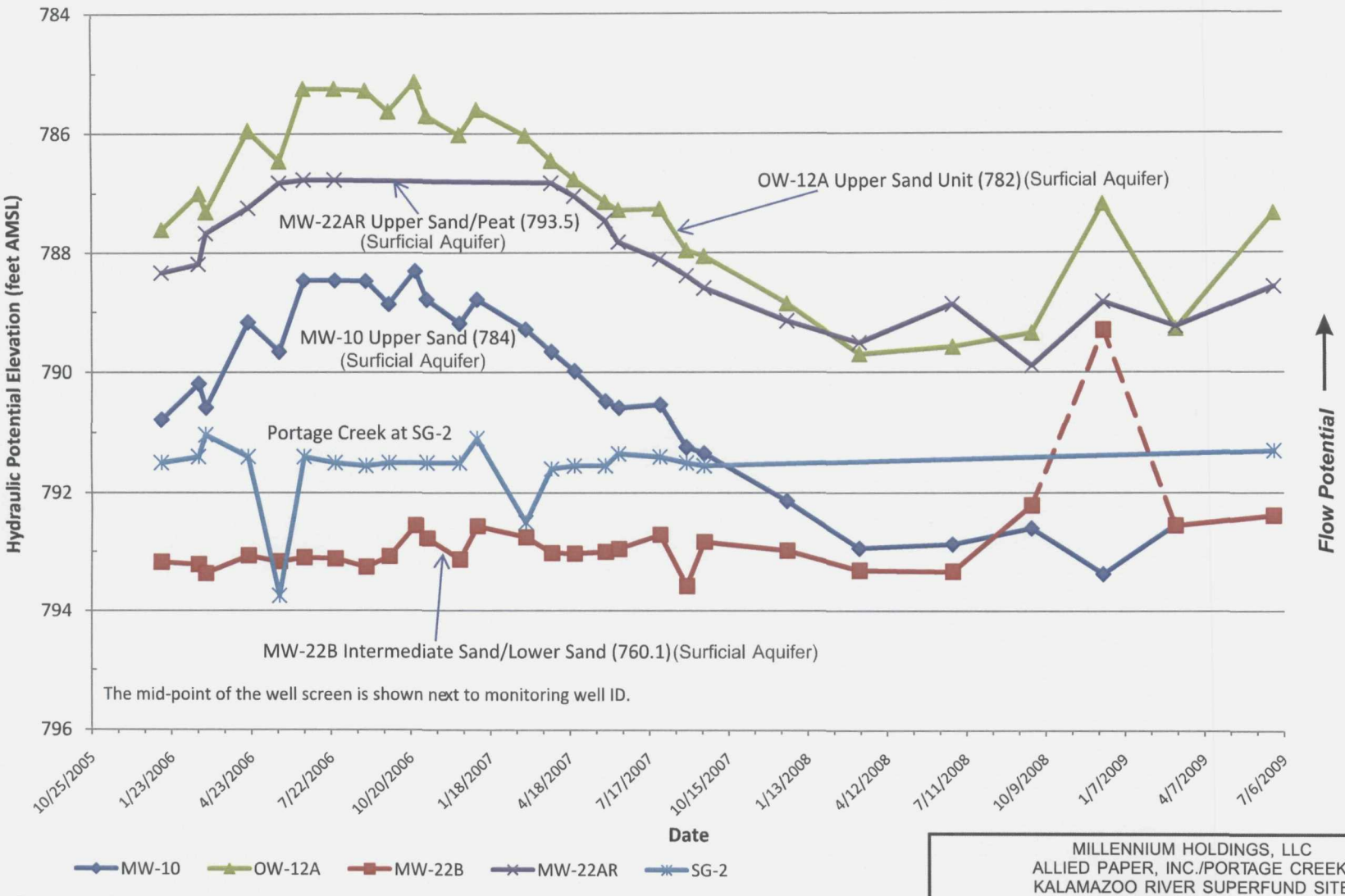
The data show a strong upward flow potential from the lower sand unit to the intermediate and upper sand units. Portage Creek is at the lowest elevation and serves as the discharge point for groundwater present in the upper, intermediate, and lower sand units.

MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

ALLIED OU - MW-204/OW-2 WELL CLUSTER GROUNDWATER ELEVATIONS 2006 - 2009

ARCADIS

FIGURE
3-9



The data show an upward [1] flow potential from the intermediate/lower sand unit to the upper sand unit and Portage Creek. The lower groundwater elevations observed in the upper sand are due to the pumping of groundwater from behind the sheet pile wall from nearby extraction well GWE-4A.

NOTE:

[1] The December 2008 elevation measurement at MW-22B is anomalous, varying by over 3.6 feet from the average of the elevations measured from 2006 to the present.

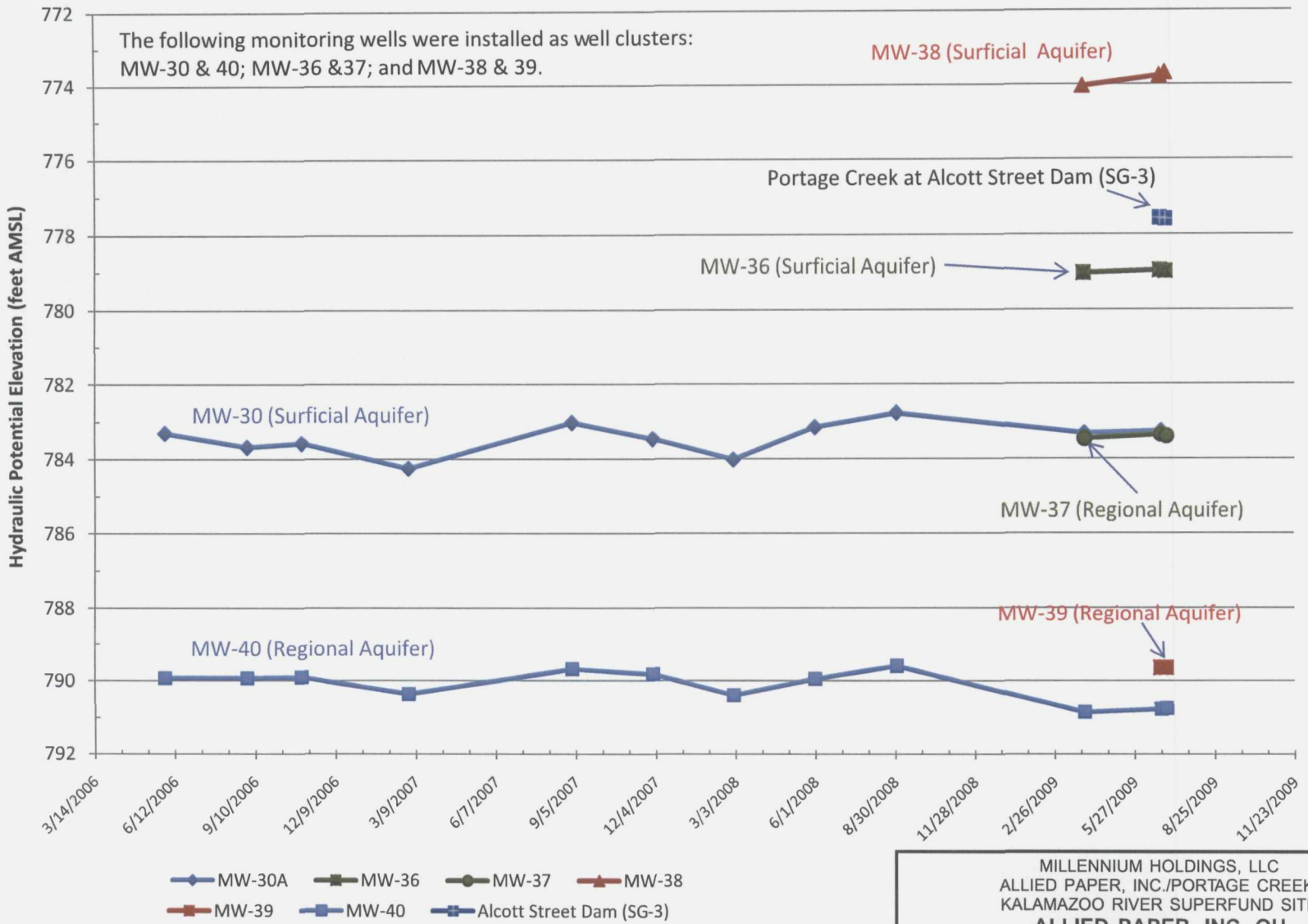
MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

ALLIED OU - MW-22/MW-10 WELL CLUSTER GROUNDWATER ELEVATIONS 2006 - 2009

ARCADIS

FIGURE
3-10

09/30/09 SYRACUSE-141ENV-DJHOWES
B0064587/0001/00003/CDR/64587G08.CDR



Data for each well cluster, consisting of a well in the surficial aquifer and a well in the regional aquifer, show a strong upward flow potential between the two aquifer systems.

MILLENNIUM HOLDINGS, LLC
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
ALLIED PAPER, INC. OU

STREBOR PROPERTY MONITORING WELL CLUSTER GROUNDWATER ELEVATIONS 2006 - 2009

ARCADIS

FIGURE
3-11

ARCADIS

Attachment A

Historical Groundwater and
Surface Water Elevation Data

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table A-1 -- Allied OU - Historical Groundwater and Portage Creek Elevation Monitoring Data, 2006 - 2009

Location	Groundwater Elevation in feet AMSL														
	1/12/2006	2/23/2006	3/3/2006	4/20/2006	5/25/2006	6/22/2006	7/27/2006	8/31/2006	9/26/2006	10/26/2006	11/8/2006	12/15/2006	1/4/2007	2/28/2007	3/29/2007
FW-101	796.56	796.64	796.56	796.35	796.31	795.63	795.44	795.75	796.19	796.70	796.75	800.36	796.76	796.65	796.61
GWE-1	788.05	788.17	788.27	788.27	788.54	788.41	788.36	788.53	788.31	788.32	788.43	788.56	788.57	788.42	788.67
GWE-1A	783.30	781.80	783.06	782.91	780.83	785.73	784.97	783.37	784.98	786.13	786.23	786.05	783.41	783.79	780.11
GWE-1P	788.07	788.14	788.28	788.29	788.35	788.40	788.37	788.27	788.29	788.29	788.42	788.55	788.57	788.40	788.65
GWE-4A	788.35	783.05	786.94	781.41	781.11	779.28	781.14	781.23	781.81	780.41	780.45	779.41	779.76	780.18	779.01
MW-5R	792.64	792.82	792.86	792.74	792.87	792.60	792.42	792.45	792.65	792.85	792.80	793.06	793.02	792.86	793.17
MW-6	797.74	797.85	797.90	797.86	798.02	797.79	797.67	797.78	797.80	797.96	797.74	798.21	798.05	797.97	798.28
MW-7	799.39	799.55	799.62	799.53	799.72	799.44	799.26	799.39	799.42	799.60	799.41	799.91	799.72	799.67	799.99
MW-8A	799.12	799.13	799.21	799.18	799.27	799.06	799.01	799.18	799.21	799.24	799.21	799.42	799.37	799.37	799.47
MW-16B	786.37	786.70	786.87	786.76	786.98	786.80	786.66	786.67	786.61	786.76	786.77	787.03	787.20	787.09	787.51
MW-19BR	794.96	795.39	795.69	795.59	795.78	795.55	795.18	794.99	795.20	795.43	795.50	795.93	796.04	795.79	796.27
MW-22AR	788.34	788.19	787.67	787.24	786.82	786.77	786.77	Dry	Dry	Dry	Dry	Dry	Dry	Dry	786.82
MW-22B	793.18	793.22	793.37	793.07	793.17	793.10	793.12	793.26	793.08	792.55	792.77	793.13	792.56	792.75	793.02
MW-23AR	795.71	795.74	795.81	795.78	795.90	795.81	795.81	795.89	795.86	795.67	795.70	795.93	795.87	795.94	796.07
MW-24R	788.53	788.47	788.39	788.33	788.39	788.32	788.40	788.43	788.41	788.39	788.50	788.58	788.50	788.49	789.17
MW-26	787.86	787.87	787.89	787.91	787.75	787.70	787.67	787.87	787.65	787.78	787.74	787.92	787.65	787.67	787.65
MW-120A	800.88	801.51	801.41	801.19	801.22	800.84	800.28	800.06	800.50	800.96	801.16	801.24	801.34	800.79	801.22
MW-120B	798.52	798.61	798.42	798.57	798.80	798.40	798.25	798.33	798.46	798.28	798.58	798.90	798.86	798.65	798.97
MW-122A	790.16	790.23	790.28	790.35	790.44	790.46	790.25	790.35	790.39	790.48	790.56	790.56	790.63	790.56	790.70
MW-122AR	790.78	790.84	790.91	791.00	791.10	791.10	791.08	790.98	791.00	791.06	791.15	791.17	791.22	791.15	791.29
MW-122B	789.55	789.66	789.73	789.68	789.83	790.26	790.28	790.15	790.13	790.18	790.22	790.40	790.39	790.38	790.53
MW-124A	808.32	809.11	810.52	810.85	810.94	812.46	812.12	811.55	811.87	811.74	811.73	812.17	812.42	813.42	813.61
MW-124B	801.88	802.09	802.63	802.69	802.87	802.78	802.71	802.71	802.62	802.55	802.65	803.08	802.61	802.92	803.25
MW-125A	792.60	792.61	792.32	792.36	792.48	791.73	791.70	791.44	792.27	792.83	792.44	793.53	792.42	793.32	792.83
MW-126A	796.26	796.57	796.47	796.35	796.28	795.93	795.78	795.99	795.11	794.70	795.96	796.07	795.55	795.59	795.86
MW-126AR	794.56	794.60	794.68	794.50	794.61	794.49	794.50	794.61	795.89	795.45	794.10	794.34	794.06	794.19	794.40
MW-200A	795.58	795.58	795.63	795.61	795.70	795.63	795.65	795.72	795.69	795.68	795.59	795.77	795.63	795.74	795.86
MW-201B	795.65	795.68	795.74	795.71	795.82	795.75	796.15	795.82	795.78	795.70	795.67	795.89	795.81	795.90	796.00
MW-202B	795.53	795.54	795.60	795.57	795.70	795.62	795.63	795.70	795.68	795.46	795.49	795.72	795.65	795.74	795.87
MW-203B	794.64	794.64	794.68	794.34	794.75	794.69	794.72	794.80	794.74	794.06	794.24	794.44	794.34	794.42	794.55
MW-204B	803.73	NM	803.90	804.39	804.59	804.50	804.43	804.42	804.42	804.29	804.33	804.48	804.54	804.74	802.95
MW-205B	792.19	792.41	792.66	792.65	792.92	792.74	792.54	792.49	792.56	792.62	792.70	793.03	793.01	792.97	793.28
MW-206A	796.08	796.10	796.16	796.78	796.24	796.15	796.14	796.20	796.19	796.15	796.11	796.34	796.28	796.30	796.43
MW-207	795.57	795.60	795.73	794.94	795.61	795.55	795.56	795.67	795.54	794.70	794.97	795.25	794.87	795.30	795.25
MW-208	795.86	795.93	796.13	795.79	795.84	795.81	795.84	796.00	795.74	795.54	795.72	796.12	795.32	795.55	795.84
MW-209	791.25	791.39	791.60	791.62	791.90	791.70	791.55	791.54	791.56	791.61	791.68	792.00	791.95	792.00	792.06
MW-210	794.92	794.92	795.02	794.86	795.00	794.92	794.92	795.02	794.93	793.84	794.13	794.40	794.13	794.30	794.45
MW-211	790.82	790.91	791.06	791.08	791.25	791.15	791.08	791.08	791.06	791.07	791.14	791.35	791.22	791.26	791.41
MW-212	787.01	787.13	787.19	787.13	787.27	787.67	787.60	787.60	787.41	787.58	787.62	787.81	787.80	787.81	787.93
MW-213	790.57	790.66	790.80	790.83	790.98	790.89	790.85	790.88	790.85	790.86	790.93	791.11	790.96	791.02	791.05
MW-214	787.47	787.45	787.52	787.48	787.53	787.19	787.14	787.40	787.45	787.51	787.53	787.69	788.17	787.71	787.76
MW-215	783.42	783.10	783.38	782.88	782.86	782.67	782.59	783.16	783.14	783.33	783.37	783.34	783.34	783.41	783.24
MW-216	781.82	781.85	781.90	781.83	781.96	782.14	782.31	782.36	782.15	782.04	781.96	782.02	782.02	781.92	782.03
MW-217	782.57	782.59	782.61	782.55	782.71	782.86	782.94	782.96	782.76	782.72	782.64	782.78	782.77	782.72	782.82
MW-218	785.20	785.41	785.41	785.35	785.48	785.50	785.44	785.44	785.30	785.32	785.30	785.52	785.55	NM	785.69

See Notes on Page 4.

Table A-1 -- Allied OU - Historical Groundwater and Portage Creek Elevation Monitoring Data, 2006 - 2009

Location	Groundwater Elevation in feet AMSL														
	1/12/2006	2/23/2006	3/3/2006	4/20/2006	5/25/2006	6/22/2006	7/27/2006	8/31/2006	9/26/2006	10/26/2006	11/8/2006	12/15/2006	1/4/2007	2/28/2007	3/29/2007
MW-219	784.00	784.07	784.12	784.06	784.18	784.29	784.30	784.34	784.14	784.64	784.10	784.28	784.29	784.81	784.48
MW-220	784.13	785.05	785.13	784.55	784.94	784.88	783.46	783.62	784.11	784.64	784.50	785.39	785.16	784.35	785.18
MW-221R	782.08	782.06	782.00	781.93	782.00	782.02	782.14	782.31	782.16	782.14	782.22	782.19	782.19	782.13	782.21
MW-222	794.23	NM	794.24	794.18	794.33	794.27	794.31	794.38	794.32	793.07	793.36	793.55	793.43	793.32	793.64
MW-223	794.04	793.82	793.90	792.45	792.63	792.73	792.90	793.15	793.10	792.95	793.11	793.51	793.06	NM	NM
MW-224	790.79	792.20	791.45	791.20	792.03	790.48	790.02	790.00	790.47	791.57	791.80	792.72	792.13	790.62	792.36
MW-225	786.08	786.16	786.12	786.04	786.36	785.92	785.86	785.89	786.16	786.40	786.12	786.95	786.57	NM	NM
MW-226	783.59	783.44	783.59	783.58	783.55	783.49	783.50	783.49	783.48	783.57	783.62	783.56	783.59	783.18	783.40
MW-227	782.26	781.84	781.72	781.34	781.61	obstructed	780.65	782.01	781.98	782.23	782.13	782.16	782.08	782.39	781.89
MW-228	783.34	783.23	783.20	782.98	782.99	783.10	782.81	783.16	783.11	783.31	783.37	783.35	783.39	783.40	783.15
MW-229	783.89	783.62	783.72	783.46	783.27	783.03	783.00	783.68	783.65	785.63	783.77	783.78	783.75	783.90	783.63
MW-230	785.52	785.68	785.39	785.14	785.45	784.80	783.97	785.13	785.26	785.59	785.36	785.95	785.56	785.30	785.61
MW-231	786.33	786.54	785.97	786.29	786.39	786.41	786.51	786.57	786.49	786.46	786.36	786.26	786.46	790.66	785.06
MW-232	782.75	782.85	782.87	782.79	782.90	782.80	782.99	783.12	782.92	782.87	782.83	782.99	783.02	782.99	783.15
OW-1A	784.65	784.77	784.92	784.86	785.03	785.26	785.20	785.11	785.13	785.15	785.24	785.91	785.43	785.38	785.58
OW-2A	786.97	786.92	786.97	786.90	787.00	786.86	786.89	786.90	786.96	786.93	787.06	787.08	787.06	787.01	787.03
OW-2B	788.75	788.85	788.01	789.01	789.17	789.04	788.99	788.99	789.00	789.00	789.12	789.32	789.24	789.25	789.40
OW-2P	786.83	786.98	786.90	786.88	786.92	786.90	786.86	786.89	786.93	786.91	786.97	787.03	786.97	786.91	786.91
OW-3AR	787.96	787.95	787.96	787.86	787.93	787.81	787.94	787.96	787.91	787.94	788.05	788.21	787.95	788.54	787.87
OW-3PR	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
OW-4AR	Obstructed	NM	NM	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed
OW-4PR	797.30	797.40	797.43	obstructed	797.45	797.47	797.46	797.39	797.81	797.14	797.29	797.20	797.34	797.27	797.31
OW-5P	796.52	797.19	797.14	796.77	797.49	796.97	796.49	796.33	796.82	797.18	797.21	797.53	797.29	796.62	797.33
OW-6A	795.76	795.78	795.82	795.82	795.91	795.82	795.82	795.87	795.85	795.80	795.77	795.29	795.87	795.97	796.12
OW-6P	798.31	799.07	798.85	798.70	799.87	798.67	797.48	797.17	798.74	799.74	799.45	800.20	799.85	798.80	800.44
OW-7P (OW-7PR)	788.73	788.82	788.92	789.00	789.10	789.11	789.11	789.01	789.03	789.00	789.11	789.13	789.16	789.04	789.19
OW-8A	782.81	782.11	783.28	782.74	783.42	785.46	784.94	783.96	784.80	785.71	785.94	785.64	784.18	785.06	785.69
OW-9PR	792.54	792.48	792.45	792.45	792.55	792.54	792.58	792.61	792.66	792.62	792.67	792.65	792.62	792.49	792.50
OW-10P	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
OW-11A	788.52	788.66	788.71	788.66	788.71	788.63	788.58	788.56	788.59	788.61	788.71	788.76	788.79	788.76	788.84
OW-11P	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
OW-12A	787.61	787.00	787.31	785.95	786.46	785.25	785.25	785.28	785.63	785.13	785.70	786.02	785.60	786.03	786.45
OW-13A	785.72	785.81	785.65	785.83	785.83	785.51	785.50	785.55	785.86	789.42	785.72	785.80	785.77	785.67	785.72
OW-13B	NM	NM	NM	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed
OW-13P	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	obstructed
OW-14P	790.06	790.10	790.11	790.04	790.13	790.07	790.13	790.20	790.20	790.19	790.21	790.22	790.10	790.76	790.11
OW-15P	796.33	796.48	796.25	796.00	796.65	795.98	795.71	795.84	796.31	796.65	796.16	797.04	796.40	795.97	796.77
OW-16P	792.40	792.54	792.15	791.89	791.89	791.81	791.61	791.59	791.71	791.56	791.52	791.81	791.48	791.96	792.18
OW-17P	789.19	789.03	789.24	789.22	789.23	789.24	789.24	789.31	789.33	789.34	789.41	789.46	789.36	789.26	789.28
PS-1	786.34	785.99	786.01	785.68	785.76	785.97	786.08	786.01	786.02	785.74	786.02	786.01	785.72	785.83	786.05
PS-2	786.95	786.43	786.60	786.78	786.96	786.81	786.54	786.98	786.49	786.84	786.79	786.56	786.66	786.91	786.59
PS-3	786.07	786.38	786.36	786.39	786.19	786.27	786.21	786.36	786.21	786.36	786.30	786.26	786.22	785.74	786.34
PS-4	786.97	787.34	786.97	787.03	786.96	786.59	786.64	787.31	786.54	787.32	787.14	787.32	787.09	789.54	786.75
PS-5	794.65	794.47	793.78	794.47	794.47	793.93	794.22	794.69	793.91	794.25	794.63	793.72	794.56	793.78	794.70
PS-6	791.05	791.06	791.06	790.52	790.50	790.05	789.73	789.81	790.21	789.91	789.95	790.38	789.81	790.66	790.79
PS-7	789.89	790.06	789.88	790.24	790.14	789.83	789.81	789.87	790.21	794.54	790.04	790.12	790.12	789.94	790.03
PS-8	790.69	790.81	790.74	790.93	790.91	790.76	790.93	790.91	790.91	790.45	790.84	790.93	790.92	790.80	791.07
PS-9	790.10	790.11	789.79	789.79	789.67	790.06	790.04	790.06	790.04	790.02	789.71	789.67	789.92	789.84	790.06
PS-10	792.44	792.65	792.67	792.35	792.67	792.45	792.57	792.49	792.48	792.45	792.57	792.45	792.43	792.45	791.75
SG-1	782.13	782.08	782.04	782.00	782.04	782.08	782.16	782.38	782.20	782.18	782.32	782.26	782.24	782.14	782.26
SG-2	791.50	791.40	791.04	791.40	793.74	791.40	791.50	791.55	791.50	NM	791.50	791.50	791.10	792.50	791.60

See Notes on Page 4.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table A-1 -- Allied OU - Historical Groundwater and Portage Creek Elevation Monitoring Data, 2006 - 2009

Location	Groundwater Elevation in feet AMSL												
	4/24/2007	5/29/2007	6/13/2007	7/30/2007	8/29/2007	9/18/2007	12/21/2007	3/12/2008	6/26/2008	9/24/2008	12/14/2008	3/6/2009	6/25-6/26/09
FW-101	796.63	795.99	795.36	794.96	795.86	795.39	796.67	796.78	795.65	796.10	796.74	796.73	795.70
GWE-1	788.71	788.59	788.50	788.28	788.33	788.35	783.27	788.70	788.57	788.46	788.39	788.86	783.26
GWE-1A	786.11	782.93	786.13	785.70	785.53	785.63	785.38	781.25	785.93	785.36	785.53	785.53	787.95
GWE-1P	788.67	808.60	808.60	808.60	808.60	808.60	808.60	808.60	808.60	808.60	803.20	803.20	797.53
GWE-4A	781.26	780.34	782.24	778.41	778.99	779.63	776.16	779.96	794.21	792.12	789.41	792.34	782.62
MW-5R	793.12	792.88	792.77	792.43	792.72	792.49	792.74	793.23	792.89	793.27	792.94	793.39	793.10
MW-6	798.25	798.18	798.06	797.65	798.00	797.67	797.73	798.25	798.22	798.75	798.17	798.55	798.61
MW-7	800.46	799.81	799.68	799.24	799.67	799.25	799.33	799.99	799.84	800.68	799.83	800.30	800.30
MW-8A	799.44	799.39	799.21	798.84	799.29	799.02	799.23	799.52	799.40	799.49	799.42	799.64	799.54
MW-16B	787.36	787.29	787.13	786.77	786.88	786.64	786.43	787.35	787.27	787.74	787.16	787.25	787.61
MW-19BR	796.33	796.06	795.90	795.26	795.29	795.14	795.18	796.41	795.08	796.51	796.44	796.69	797.49
MW-22AR	787.04	787.46	787.82	788.11	788.39	788.60	789.15	789.51	788.87	789.89	788.83	789.24	788.58
MW-22B	793.03	793.00	792.95	792.71	793.57	792.83	792.98	793.31	793.33	792.21	789.30	792.55	792.38
MW-23AR	796.02	796.00	795.91	795.69	795.91	795.78	795.86	796.15	796.12	796.17	796.02	796.20	793.65
MW-24R	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed
MW-26	787.60	787.63	787.57	787.47	787.68	787.64	787.78	787.69	787.59	787.60	787.79	787.68	787.58
MW-120A	801.34	800.97	800.72	799.96	799.99	800.28	800.84	801.68	800.90	800.86	800.78	801.48	801.06
MW-120B	798.94	798.80	798.62	798.13	798.62	798.30	798.53	799.13	798.92	799.43	798.84	799.31	799.06
MW-122A	790.72	790.68	790.59	790.43	790.59	790.50	790.40	790.73	790.74	790.76	790.65	790.77	790.82
MW-122AR	791.34	791.29	791.18	791.02	791.10	791.03	790.98	791.32	791.35	791.25	791.23	791.43	791.38
MW-122B	790.55	790.40	790.35	790.16	790.66	790.11	790.09	790.55	790.45	790.58	790.46	790.78	791.03
MW-124A	813.78	813.49	813.11	812.82	812.75	812.41	809.75	812.29	813.89	814.78	812.45	814.07	814.62
MW-124B	803.30	803.23	803.08	802.24	802.56	802.41	802.41	803.15	803.33	803.28	803.04	803.73	803.68
MW-125A	792.73	792.53	792.27	791.25	792.62	791.64	792.27	792.53	792.81	792.70	792.75	793.15	793.06
MW-126A	795.78	795.58	795.49	795.28	795.76	795.61	796.47	796.46	796.05	796.00	795.58	795.78	795.57
MW-126AR	794.35	794.30	794.32	794.04	794.27	794.15	794.32	794.57	794.52	793.99	793.98	794.24	794.09
MW-200A	795.78	795.78	795.68	795.38	795.67	795.48	795.58	795.78	795.76	795.35	795.46	795.66	795.52
MW-201B	795.93	795.92	795.82	795.60	795.80	795.67	795.77	796.05	796.00	796.02	795.83	795.99	795.89
MW-202B	795.80	795.90	795.72	795.53	795.73	795.61	795.67	795.95	796.00	796.07	795.86	796.03	792.19
MW-203B	794.52	794.51	794.44	794.30	794.51	794.42	794.40	794.65	794.67	794.71	794.52	794.64	790.38
MW-204B	805.31	805.22	805.03	804.14	804.57	804.39	804.35	DRY	805.23	805.27	805.15	802.25	805.86
MW-205B	793.36	793.23	793.09	792.56	792.71	792.51	792.47	793.27	793.29	793.45	793.15	793.70	793.70
MW-206A	796.37	796.27	796.25	795.99	796.20	796.06	796.14	796.45	796.40	796.11	796.13	796.37	796.25
MW-207	795.27	795.24	795.20	794.98	795.20	795.13	795.18	795.51	795.53	794.74	794.79	795.02	794.90
MW-208	795.86	795.82	795.80	795.52	795.72	796.13	795.80	796.14	796.13	794.48	794.65	794.95	790.70
MW-209	792.06	792.04	791.90	791.55	791.74	791.56	791.54	792.12	792.08	792.28	NM	overflowing	NA
MW-210	794.46	794.43	794.38	794.25	794.47	794.37	794.40	794.67	794.69	794.74	794.30	794.48	794.39
MW-211	791.44	791.43	791.31	791.03	791.25	791.10	791.09	791.49	791.53	791.60	791.57	791.79	791.74
MW-212	787.87	787.79	787.67	787.57	787.63	787.50	787.47	787.96	787.83	787.91	787.84	787.81	788.31
MW-213	791.18	791.14	791.03	790.80	791.01	790.88	790.87	791.19	791.17	791.20	NM	791.48	791.53
MW-214	787.66	787.41	787.24	787.31	787.11	787.16	787.51	787.74	787.37	787.52	787.73	787.82	787.63
MW-215	782.95	783.03	782.38	782.08	780.86	782.86	783.33	783.29	782.59	783.09	783.41	783.51	782.66
MW-216	781.97	782.06	782.17	782.30	782.37	782.19	781.89	782.05	782.49	782.30	782.15	782.12	782.19
MW-217	782.72	783.31	782.92	782.93	782.96	782.82	782.57	782.77	783.08	782.92	782.81	782.91	782.91
MW-218	785.65	785.62	785.62	785.44	785.47	785.31	784.95	785.39	785.56	785.45	785.44	785.51	785.71

See Notes on Page 4.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table A-1 -- Allied OU - Historical Groundwater and Portage Creek Elevation Monitoring Data, 2006 - 2009

Location	Groundwater Elevation in feet AMSL												
	4/24/2007	5/29/2007	6/13/2007	7/30/2007	8/29/2007	9/18/2007	12/21/2007	3/12/2008	6/26/2008	9/24/2008	12/14/2008	3/6/2009	6/25-6/26/09
MW-219	784.42	784.46	784.51	784.42	784.44	784.27	783.52	783.92	784.32	784.16	784.13	784.37	784.49
MW-220	785.08	784.46	784.02	783.10	783.94	783.83	783.96	785.17	784.61	785.91	784.14	785.27	784.15
MW-221R	782.08	782.08	782.05	782.27	782.34	782.23	782.01	782.13	782.19	782.28	782.25	782.12	782.08
MW-222	793.63	794.07	793.54	793.45	793.65	793.58	793.57	793.00	793.74	793.51	793.44	793.58	793.54
MW-223	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	792.75
MW-224	792.02	790.75	790.46	790.01	790.38	790.18	791.14	791.67	790.54	792.01	790.70	792.45	790.89
MW-225	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	787.34
MW-226	783.50	783.48	783.37	783.25	783.66	783.48	783.67	783.64	783.59	783.61	783.75	783.67	783.46
MW-227	781.30	781.91	780.84	NM	781.59	NM	782.23	782.37	NM	781.79	782.59	782.38	781.55
MW-228	783.04	783.05	782.79	782.71	782.94	782.80	783.35	783.30	782.85	783.23	783.56	783.50	782.91
MW-229	783.41	783.61	782.78	NM	783.37	782.69	783.83	783.86	782.88	783.49	784.01	783.82	783.24
MW-230	785.48	785.46	784.39	783.55	785.54	784.66	785.30	785.58	784.77	785.57	785.67	785.68	785.12
MW-231	786.46	786.45	786.48	786.53	786.72	786.53	obstructed	obstructed	786.76	786.73	NM	784.64	786.68
MW-232	783.07	783.03	783.00	783.14	783.19	783.05	782.72	783.09	783.17	783.38	783.14	783.28	783.16
OW-1A	785.60	785.48	785.39	785.16	785.26	785.09	785.03	785.60	785.53	785.60	785.45	785.86	785.98
OW-2A	787.06	787.01	786.98	787.04	787.04	787.02	787.02	787.17	787.16	787.21	787.19	787.31	787.18
OW-2B	789.47	789.40	789.31	789.01	789.18	789.07	789.05	789.45	789.57	789.62	789.55	789.82	789.76
OW-2P	786.98	786.95	786.94	787.00	786.99	786.99	786.91	787.05	787.07	787.12	787.04	787.15	787.06
OW-3AR	788.77	787.81	787.85	787.88	787.99	788.01	788.12	788.03	788.01	787.92	790.01	787.93	787.72
OW-3PR	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	obstructed	obstructed
OW-4AR	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	791.96	792.74	792.28	792.70	obstructed	792.42	dry/damaged
OW-4PR	797.31	797.35	797.39	797.39	797.34	797.30	797.01	797.24	794.33	794.18	793.76	794.04	797.14
OW-5P	797.33	796.97	796.79	796.08	796.64	796.72	797.23	798.32	797.36	797.41	796.90	798.14	dry/damaged
OW-6A	796.05	796.05	795.94	795.70	795.89	795.75	796.30	796.63	796.56	796.76	796.35	796.52	796.42
OW-6P	800.55	799.62	798.81	797.20	798.22	797.96	799.42	800.37	798.53	798.53	798.67	800.77	799.29
OW-7P (OW-7PR)	789.35	789.39	789.37	789.10	789.07	789.04	788.44	789.27	789.54	789.27	789.22	789.64	789.76
OW-8A	785.09	783.91	785.73	784.94	obstructed	obstructed	obstructed	obstructed	NM	NM	obstructed	obstructed	obstructed
OW-9PR	792.53	792.65	792.57	792.60	792.64	792.66	792.65	792.58	792.62	792.67	792.64	792.58	792.65
OW-10P	dry	dry	dry	dry	dry	dry	obstructed	obstructed	NM	NM	obstructed	obstructed	obstructed
OW-11A	788.82	788.72	788.68	789.02	788.68	788.59	788.59	788.87	788.72	788.79	788.71	788.99	788.98
OW-11P	dry	dry	dry	dry	dry	dry	obstructed	obstructed	NM	NM	786.97	obstructed	obstructed
OW-12A	786.76	787.14	787.28	787.26	787.96	788.06	788.86	789.70	789.58	789.35	787.18	789.28	787.34
OW-13A	785.72	785.86	785.80	785.72	785.95	785.96	786.04	786.05	786.01	786.19	785.99	786.15	785.92
OW-13B	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	793.55	obstructed	obstructed
OW-13P	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed	obstructed
OW-14P	790.95	790.14	790.18	790.21	790.33	790.32	790.31	790.23	790.41	790.38	790.25	790.23	790.26
OW-15P	796.48	796.01	795.95	795.28	796.60	795.75	796.23	796.84	796.14	796.18	796.19	797.00	796.29
OW-16P	792.30	792.36	792.47	792.38	792.53	792.66	793.11	793.74	792.59	793.52	792.25	789.29	792.65
OW-17P	789.35	789.31	789.34	789.38	789.43	789.41	789.34	789.46	789.47	789.96	789.46	789.58	789.38
PS-1	785.93	785.85	786.00	785.87	786.00	786.00	785.98	785.73	786.09	785.99	786.00	786.11	NM
PS-2	786.67	786.38	786.78	788.10	786.81	786.81	786.89	786.66	786.76	786.53	786.24	786.54	NM
PS-3	786.25	785.21	786.42	785.91	786.35	786.23	786.40	786.23	785.86	786.33	785.79	786.36	NM
PS-4	790.14	786.76	786.96	786.69	786.93	787.07	786.79	786.89	786.97	786.91	786.72	786.59	NM
PS-5	793.91	794.46	794.57	794.13	794.09	794.00	794.20	796.90	796.26	793.81	794.20	794.53	NM
PS-6	790.86	791.24	790.94	791.13	790.66	791.04	790.86	791.16	790.77	791.03	791.09	793.73	NM
PS-7	790.04	790.17	790.07	789.99	790.19	790.19	790.15	790.17	790.18	790.23	790.16	790.33	NM
PS-8	790.82	790.85	790.90	790.95	790.76	790.96	790.70	790.96	790.92	790.97	790.85	790.88	NM
PS-9	790.10	789.71	789.74	789.70	789.87	789.94	789.73	789.91	789.76	789.86	789.94	789.64	NM
PS-10	792.50	792.13	792.45	792.55	792.45	792.62	792.55	792.73	792.73	792.93	791.85	792.25	NM
SG-1	782.10	782.15	782.10	782.29	782.38	782.32	NM	NM	NM	NM	NM	NM	781.92
SG-2	791.55	791.55	791.35	791.40	791.50	791.55	NM	NM	NM	NM	NM	NM	791.30

Notes:
NM = not measured.
feet AMSL = feet above mean sea level.
Elevations are based on the existing Allied OU site control, which is referenced to the National Geodetic Vertical Datum (NGVD) of 1929.
Groundwater level for MW-209 was at the top of casing.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table A-2 -- Strebor Property - Historical Groundwater Elevation Monitoring Data

Well Number	Top of Casing Elevation (feet AMSL)[1]	3/1/2004[2]		6/1/2004[2]		9/1/2004[2]		3/1/2005[2]		6/1/2005[2]		9/1/2005[2]		3/1/2006[2]	
		Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)
MW-1	802.79	NM		NM		NM		NM		NM		NM		NM	
MW-7	795.28	NM		NM		NM		NM		NM		NM		NM	
MW-15	797.23	NM		NM		NM		NM		NM		NM		NM	
MW-21	794.63	NM		NM		NM		NM		NM		NM		NM	
MW-24	795.04	NM		NM		NM		NM		NM		NM		NM	
MW-25	795.04	NM		NM		NM		NM		NM		NM		NM	
MW-30A	796.32	12.94	783.38	12.74	783.58	13.06	783.26	11.30	785.02	12.44	783.88	13.51	782.81	12.52	0.22
MW-35	794.88	NM		NM		NM		NM		NM		NM		NM	
MW-36	788.55	NM		NM		NM		NM		NM		NM		NM	
MW-37	788.28	NM		NM		NM		NM		NM		NM		NM	
MW-38	781.5	NM		NM		NM		NM		NM		NM		NM	
MW-39	781.55	NM		NM		NM		NM		NM		NM		NM	
MW-40	796.51	6.82	789.69	6.56	789.95	NM		5.94	790.57	5.95	790.56	6.61	789.9	6.61	789.9

Well Number	Top of Casing Elevation (feet AMSL)[1]	6/1/2006[2]		9/1/2006[2]		12/1/2006[2]		3/1/2007[2]		9/1/2007[2]		12/1/2007[2]		3/1/2008[2]	
		Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)
MW-1	802.79	NM		NM		NM		NM		NM		NM		NM	
MW-7	795.28	NM		NM		NM		NM		NM		NM		NM	
MW-15	797.23	NM		NM		NM		NM		NM		NM		NM	
MW-21	794.63	NM		NM		NM		NM		NM		NM		NM	
MW-24	795.04	NM		NM		NM		NM		NM		NM		NM	
MW-25	795.04	NM		NM		NM		NM		NM		NM		NM	
MW-30A	796.32	13.02	783.3	12.64	783.68	12.74	783.58	12.07	784.25	13.3	783.02	12.86	783.46	12.3	784.02
MW-35	794.88	NM		NM		NM		NM		NM		NM		NM	
MW-36	788.55	NM		NM		NM		NM		NM		NM		NM	
MW-37	788.28	NM		NM		NM		NM		NM		NM		NM	
MW-38	781.5	NM		NM		NM		NM		NM		NM		NM	
MW-39	781.55	NM		NM		NM		NM		NM		NM		NM	
MW-40	796.51	6.58	789.93	6.58	789.93	6.6	789.91	6.15	790.36	6.83	789.68	6.69	789.82	6.11	790.4

Well Number	Top of Casing Elevation (feet AMSL)[1]	6/1/2008[2]		9/1/2008[2]		March 23 - April 1, 2009[2]	
		Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)
MW-1	802.79	NM		NM		10.05	792.74
MW-7	795.28	NM		NM		8.06	787.22
MW-15	797.23	NM		NM		9.25	787.98
MW-21	794.63	NM		NM		9.84	784.79
MW-24	795.04	NM		NM		9.68	785.36
MW-25	795.04	NM		NM		7.87	787.17
MW-30A	796.32	13.17	783.15	13.55	782.77	NM	
MW-35	794.88	NM		NM		8.89	785.99
MW-36	788.55	NM		NM		9.52	779.03
MW-37*	788.28	NM		NM		4.82	783.46
MW-38	781.5	NM		NM		7.46	774.04
MW-39*	781.55	NM		NM		NM	
MW-40*	796.51	6.56	789.95	6.91	789.6	5.65	790.86

See Notes on Page 2.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table A-2 -- Strebor Property - Historical Groundwater Elevation Monitoring Data

Notes:
ft = feet
AMSL = above mean sea level.
Quarterly depth to water measurements were provided by Bay West on April 7, 2009. The exact dates when measurements were collected during the quarter were not included in the data transmission, so it was assumed that the measurements were collected on the first day of each quarter.
Elevations are based on the existing Allied OU site control, which is referenced to the National Geodetic Vertical Datum (NGVD) of 1929.
[1] Surveyed by Prein & Newhof in 2009.
[2] Measurements were made by Bay West personnel.
NM = not measured.
TOC = Top of casing
* MW-37, MW-39, and MW-40 are screened in the Regional Aquifer Unit, the other wells are screened in the Surfical Aquifer Unit.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table A-3 -- Panelyte Property - Historical Groundwater Elevation Monitoring Data

Well Number	Aquifer Unit	June 24, 2002		October 20, 2003	
		Depth to Water (ft below TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft below TOC)	Groundwater Elevation (feet AMSL)
MW1	Surficial	8.47	788.69	8.54	788.62
MW2	Surficial	8.80	787.18	9.06	786.92
MW3	Surficial	6.19	793.25	NM	NM
MW4	Surficial	6.84	788.49	6.84	788.49
MW5	Surficial	7.08	787.97	6.90	788.15
MW6	Surficial	7.22	785.48	7.09	785.61
MW7	Surficial	8.53	786.87	8.70	786.70
MW8	Surficial	6.76	789.14	6.59	789.31
MW9	Surficial	0.46	780.65	1.32	779.79
MW10	Surficial	-0.3*	781.86	-0.6*	782.16
MW11	Surficial	1.57	781.38	2.17	780.78

Notes:

ft = feet

AMSL = above mean sea level.

Well construction information and 2002 and 2003 groundwater elevation data are from the Preliminary Site Assessment Report, Former Panelyte Site, Kalamazoo Michigan, Malcolm Pirnie, December 8, 2004.

Elevations are based on the existing Allied OU site control, which is referenced to the National Geodetic Vertical Datum (NGVD) of 1929.

* - Static water level was above top of casing. Value is approximate.

NM = not measured.

TOC = Top of casing

Aquifer Unit designations are based on aquifer designations in Figure 2 from the April 30, 2008 MDEQ Memorandum from Brant Fisher to Paul Bucholtz.

Millennium Holdings, LLC
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allied Paper, Inc. Operable Unit
Supplemental Groundwater Investigation Report

Table A-4 Performance Paper Property - Historical Groundwater Elevation Monitoring Data

Well Number	Aquifer Unit	9/21/2005		6/8/2006	
		Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)	Depth to Water (ft from TOC)	Groundwater Elevation (feet AMSL)
ATL-03	Surficial	NA	NA	NA	NA
ATL-04	Surficial	20.24	760.03	18.18	762.09
ATL-05	Surficial	10.08	763.34	9.20	764.22
MW2-02	Surficial	18.25	765.15	17.37	766.03
MW-3	Surficial	NA	NA	NA	NA
MW3-01	Surficial	14.38	763.06	NA	NA
MW3-02	Surficial	14.81	763.00	13.55	764.26
MW3-04	Surficial	NA	NA	NA	NA
MW-4	Surficial	NA	NA	NA	NA
MW-5	Surficial	NA	NA	NA	NA
MW-6	Surficial	NA	NA	NA	NA
MW-7	Surficial	NA	NA	NA	NA
MW-9	Surficial	17.02	770.62	16.86	770.78
MW-10D	Surficial	12.29	769.23	11.76	769.76
MW-10S	Surficial	13.87	766.86	13.41	767.32
MW-11	Surficial	8.51	770.45	7.56	771.40
MW-12D	Surficial	5.50	766.15	5.16	766.49
MW-12S	Surficial	6.06	765.35	4.64	766.77
MW-13	Surficial	23.10	765.30	22.03	766.37
MW-14	Surficial	7.55	760.21	6.48	761.28
MW-15D	Surficial	18.46	761.33	NA	NA
MW-15S	Surficial	18.80	760.92	NA	NA
MW-16D	Surficial	16.88	760.48	15.37	761.99
MW-16S	Surficial	16.47	760.47	15.82	761.12
MWB-02	Surficial	NA	NA	NA	NA
MWB-03	Surficial	NA	NA	NA	NA
MWLTI	Surficial	16.72	NA	15.68	NA
PW-1	Surficial	22.19	767.28	21.38	768.09
PW-2	Surficial	20.57	765.61	20.10	766.08
PW-3	Surficial	12.22	766.00	12.09	766.13
PW-4	Surficial	10.78	764.85	9.57	766.06
PW-5	Surficial	10.45	764.59	9.67	765.37
PW-6	Surficial	10.71	763.53	8.72	765.52

Notes:
ft = feet
AMSL = above mean sea level.
NA = not available.
Elevations are based on the existing Allied OU site control, which is referenced to the National Geodetic Vertical Datum (NGVD) of 1929.
TOC = Top of casing
Aquifer Unit designations are based on aquifer designations in Figure 2 from the April 30, 2008 MDEQ Memorandum from Brant Fisher to Paul Bucholtz.